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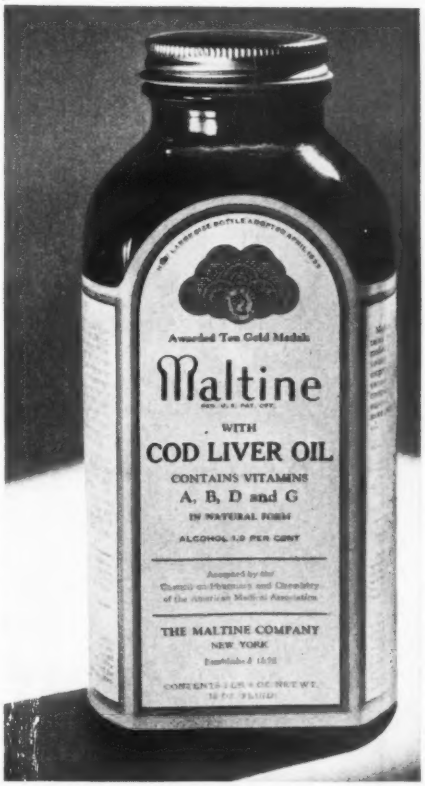

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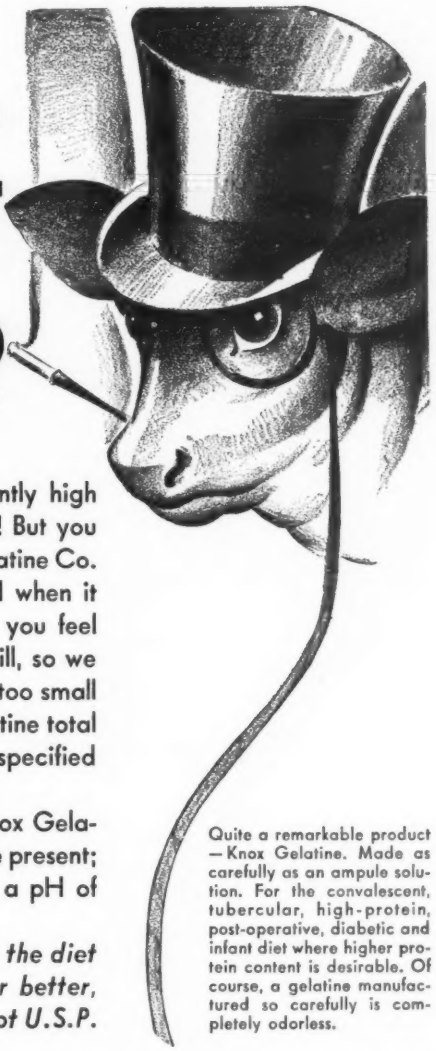

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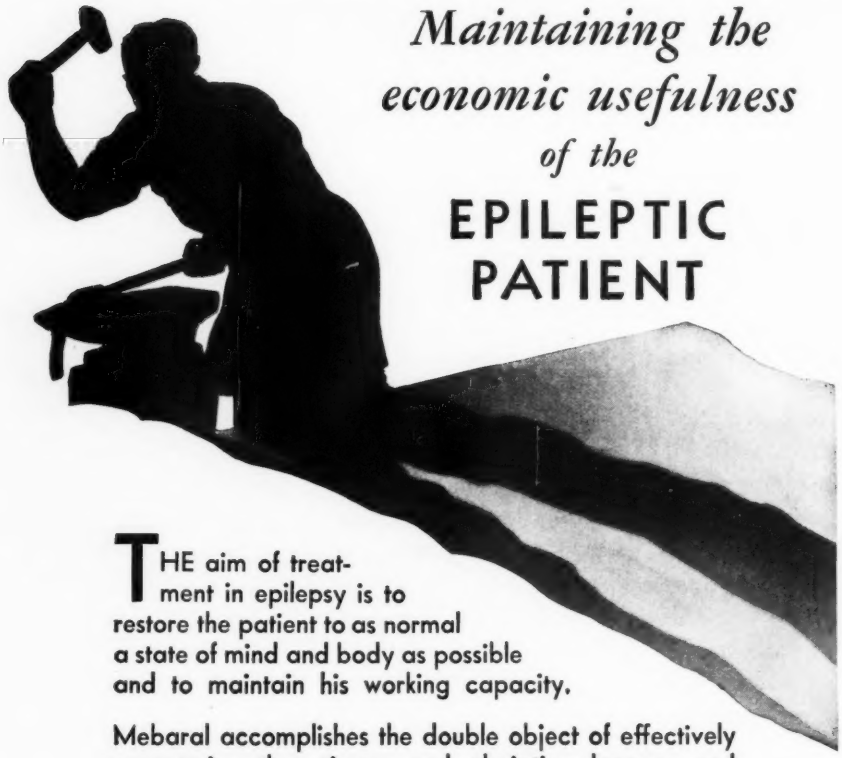

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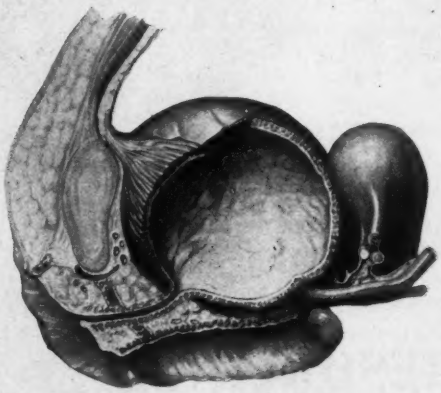

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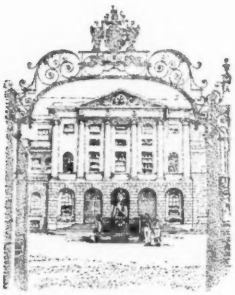

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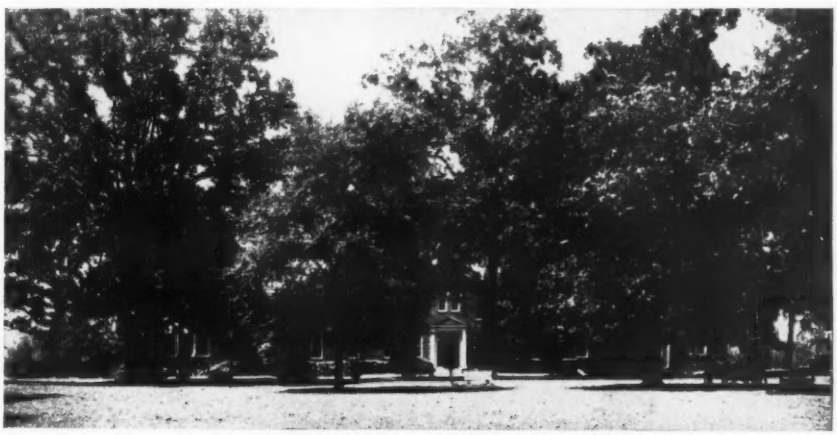

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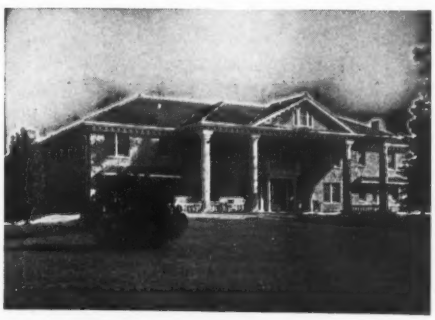

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TRANSURETHRAL PROSTATIC RESECTION*

WITH A REPORT OF 551 RESECTIONS

By HERMAN L. KRETSCHMER, M.D.,
Chicago, Illinois

I do not wish at this time to review the history of the development of transurethral resection because you are as familiar with the story as I am, but to present my personal experiences in a series of 551 resections.

In modern urology two outstanding developments have taken place: (1) greater accuracy in diagnosis; (2) a gradual but definite tendency away from operative surgery in the treatment of many lesions of the urinary organs. As a matter of fact, many of the members of this section have played an important part in this changing line of treatment.

However, it may not be amiss to review briefly this tendency. The treatment of acute renal infections by ureteral catheter drainage in the simple infections, as well as in acute pyelitis of pregnancy, has replaced surgical drainage in these conditions. And likewise, the treatment of so-called chronic pyelitis, with ureteral catheterization and silver nitrate injections, results in a cure in most cases.

The non-surgical treatment of stone in the ureter by means of various instrumental manipulations through the cystoscope, as well as the injections of various drugs, sterile oil, glycerine, and local anesthetics, has greatly reduced the number of open operations for the removal of stone in the ureter.

Dilatation of certain cases of stricture of the ureter makes open surgery unnecessary.

One of the most important advances indicative of a departure from open surgery is the treatment of benign papillomata of the bladder by fulguration through the cystoscope. The brilliant results, the freedom from complications, no mortality, and no hospitalization, stand out in marked contrast to the surgical results obtained prior to the institution of this form of treatment by Edwin Beer.

This tendency away from open surgery has gone one step further in the attempts to relieve the various types of bladder neck obstruction by transurethral methods. As early as the sixteenth century Ambroise Paré (1510-1590) had attempted transurethral methods, and the English surgeons made similar attempts (Blizzard, in 1806; Guthrie, in 1834; Stafford, in 1828). The present era of transurethral resection began with the work of Goldschmidt (1906) when he devised his water-dilating posterior urethroscope.[1] The role played by American urologists in the development of this subject has been described in detail in a previous publication.[2]

Whenever a new form of therapy is presented, especially if it be a rather radical departure from the universally accepted and generally used treatments, an interesting situation arises, namely, a division into various schools of thought. In the first group we find those who accept wholeheartedly the new procedure and believe that the ideal measure has been found. In the second group are those who are loath to take up the new procedure and who strongly support the methods that have served them well during the past. This situation has always been present in any field of human endeavor, and it was only natural that it should arise when transurethral resection was introduced into our armamentarium.

A careful consideration of this statement, as it applies to the treatment of bladder-neck obstruction, reveals the following situation.

In the first group were those who enthusiastically accepted non-surgical treatment of prostatic obstruction and were of the firm opinion of its applicability in every case.

*Read in Section on Urology, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

In the second group were men who believed that the procedure was not a true surgical one, and who objected to its use on the ground that the entire obstruction was not removed and hence there would certainly be recurrences.

In a third group were those who assumed a middle-of-the-road attitude and made a careful selection of cases, reserving for open operation the large hypertrophic prostates and cases in younger men.

Whether or not resections will be followed by recurrences can only be determined by the passing of time. Nevertheless, a significant matter to record at this time is the fact that true recurrences have been seen and reported following complete prostatectomy.[3]

From the standpoint of the patient, resection is a less formidable procedure than surgery, and should a recurrence develop and cause symptoms a second resection can easily be done.

My own personal viewpoint on this subject can be summarized very briefly. I have made no selection of cases, and in the past thirty-three months I have performed only one prostatectomy. No patient was refused resection either because of the size of the prostate or of its pathologic condition, and no patient was refused resection because of his general condition, although many suffered from serious organic disease, conditions which necessarily precluded them from undergoing open surgery to relieve the obstruction. This group will be discussed in detail under the heading of associated pathologic conditions.

To date I have performed 551 resections on 495 patients. In other words, in 56, or 10.16 per cent, of the cases a second resection was necessary. I am not at all averse to performing a second resection, and in cases with large hypertrophies I frankly tell the patient beforehand that it may be necessary to perform a second resection.

In this group are included three cases in which three resections were necessary. One patient, aged 79 years, had two resections done before I saw him. He still had twelve ounces of residual urine, badly infected. The third resection gave complete relief. The second patient, a man of 61 years, had had two resections. Two years later he returned with profuse bleeding. The resectoscope was introduced to stop the bleeding. This was done by fulguration, and after the bleeding was stopped a further resection was done, and although the patient had no residual urine, quite a moderate amount of tissue was removed. The third patient, aged 68 years, had an unusually large prostate and was frankly told that because of its enormous size two resections would be necessary. A third resection was needed completely to relieve his obstruction.

Second resections were necessary in some of the cases of carcinoma in which the carcinoma recurred, producing symptoms which demanded and justified a second resection.

Furthermore, second resections were necessary in some cases in which I failed to remove enough tissue to relieve the obstruction completely.

It is a well-known fact and has been repeatedly proven by published statistics of large groups of cases that the mortality in prostatectomy increases with each decade.

I believe that, in general, this is the experience of all urologists who have operated upon a large series of cases; granted, of course, that there may be exceptions to the rule. This fact has deprived some of the patients in the upper group (80 to 95) from being relieved of their obstruction by open operation. You will all agree, I am sure, that if the patient over eighty can be relieved of his obstruction by a procedure relatively free from danger, even if he must undergo a second resection, that resection is better than the risk of surgical intervention at this time of life.

In the following table the incidence of age in this series is given.

AGE

Youngest patient	30 years
Oldest patient	89 years
30 to 40 years	3 cases
40 to 50 years	10 cases
50 to 60 years	102 cases
60 to 70 years	243 cases
70 to 80 years	112 cases
80 to 90 years	25 cases
	495 cases

One of the objections that has been raised to resection is the fact that one may overlook a case of carcinoma of the prostate and thereby miss the opportunity of instituting early treatment after resection with radium or deep x-ray; that is, if in the occasional case this oversight should occur. However, I am sure that those of you who have a large series of prostatectomies to your credit have at least on one occasion been surprised to have a patient return with a carcinoma in whom the sections were reported as benign at the time the prostate was removed.

Further objection has been raised to the fact

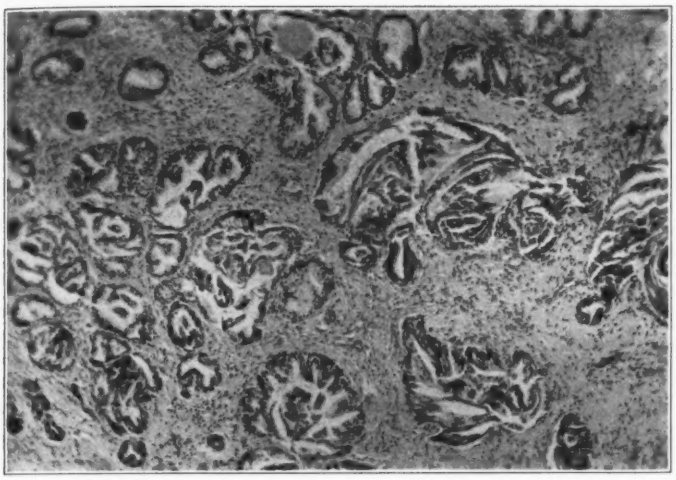

Fig. 1
Benign hypertrophy of the prostate.

that histological examination with resection is not possible. This has not been my experience. Careful examination of pieces removed is possible and is routine. We have had no trouble in obtaining good histologic sections in all of our cases (*Figs. 1* and *2*).

The ratio of carcinoma to benign hypertrophy has been variously given by different authors and in my experience varies from time to time.

The following table gives the incidence of carcinoma in this series of cases.

Benign hypertrophy:
495 cases.....(88.7 per cent)
Carcinoma:
56 cases .....(11.3 per cent)

It almost seems superfluous to call attention to the necessity of a careful history and physical examination, as well as a careful preparation of the patient before resection. There seems to be a more or less widespread belief that resection is simply a minor procedure; that it can be done in the office between trains. I recently had a patient who drove 350 miles to Chicago and wanted to be resected in the office at once so that he might drive back home that afternoon. It cannot be too often emphasized that success in resection depends upon the amount of preoperative study and preparation given the individual case, the preparation naturally varying in each case.

We were greatly impressed by the large number of patients in this series who suffered from lesions of the cardiovascular system. This may be due, in part, to the fact that many more so-called "bad risks" present themselves for resection than one would ordinarily see in a similar group of candidates for surgical prostatectomy. In a previous study of cases of prostatectomy there were 35.8 per cent with heart disease.[4] A study in this series showed that 60.6 per cent suffered from cardiovascular disease of varying degree. Following is a table showing the types of cardiovascular lesions. (See next page.)

Although the cardiovascular group consists of the largest number of patients with serious coexisting disease, various other lesions were

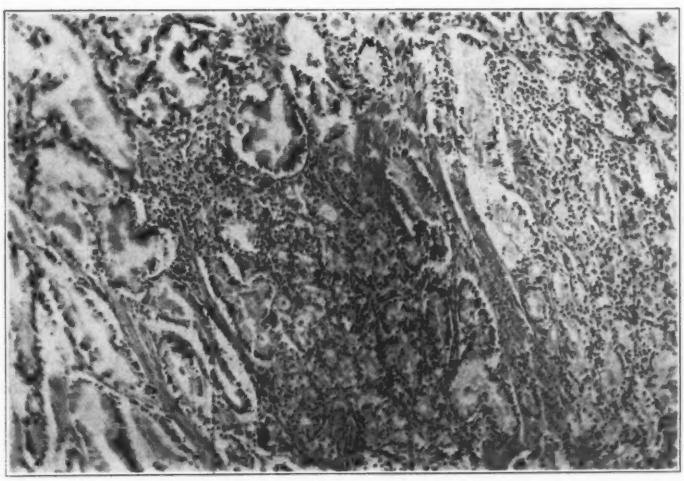

Fig. 2
Carcinoma of the prostate.

TYPES OF CARDIOVASCULAR DISEASE

Myocarditis	206 cases
Coronary disease	30 cases
Angina pectoris	12 cases
Hypertension	79 cases
	327 cases

found. Two of the patients, for example, had large carcinomata of the stomach, with extensive metastases to the liver and complete retention of urine that could no longer be relieved by the indwelling catheter. Resections were done in both, with complete relief.

Ten patients with associated disease of the central nervous system were resected successfully. Contrary to the belief that such patients are apt to have incontinence following resection, all are perfectly continent. There were twenty-one diabetics, and all were referred to the diabetic service for preliminary study and preparation, as well as close postoperative supervision. All had a smooth and uneventful convalescence.

The following table shows the associated general pathologic conditions found in this series.

Diabetes mellitus	21 cases
Syphilis	10 cases
Cord bladder	6 cases
Pulmonary embolism	3 cases
Bronchial asthma	2 cases
Cerebral thrombosis	2 cases
Carcinoma of stomach and liver	2 cases
Buerger's disease	1 case
Hemiplegia	1 case
Manic depressive psychosis	1 case
Paralysis agitans	1 case
Duodenal ulcer	1 case
Polycythema vera with erythro melalgia	1 case
Parkinson's disease	2 cases

It is a well-known clinical observation that many of these patients suffer from other lesions of the urinary tract besides the prostatic obstruction. A knowledge of coexisting disease is quite important, since it may change the method of procedure. Although pyelograms after intravenous dye injections have not always been made, we have been surprised to observe how frequently they show the presence of an unsuspected hydronephrosis.

I recently saw a patient in consultation who, several weeks after his resection, developed chills and fever and a severe pyuria that persisted, in spite of bladder irrigations. A pyelogram showed the presence of an enormous bilateral hydronephrosis and hydroureters. A preoperative intravenous pyelogram would have apprised the physicians in charge of the presence of this hydronephrosis and naturally would have explained the cause of and the persistence of the patient's symptoms. Although we do not make intravenous pyelograms routinely, still I feel that in cases of impaired function it might be well to make an intravenous pyelogram to rule out disturbed function due to hydronephrosis.

The incidence of the presence of diverticula in this series of cases was 7.35 per cent. In order not to overlook the presence of a diverticulum, we employ routine cystography, except in cases in which an intravenous pyelogram has been done, and this shows the presence of a diverticulum. The value of cystography in the diagnosis of diverticula need not be emphasized at this time other than to say that every once in a while a diverticulum is found when not suspected, and often a large diverticulum is shown that was missed by other methods of diagnosis (*Fig. 3*).

In the following table the incidence of associated genitourinary disease is given.

ASSOCIATED GENITOURINARY DISEASE

Diverticula of the bladder	67 cases
Bladder calculi	21 cases
Carcinoma of the bladder	19 cases
Prostatic calculi	16 cases
Kidney calculi	12 cases
Ureteral calculi	5 cases
Solitary kidney	2 cases
Papillomata of the bladder	4 cases

RESIDUAL URINE

One of the concomitant findings in prostatic obstruction is the presence of residual urine. This, of course, varies greatly from the patient

Fig. 3
Cystogram showing the presence of large unsuspected diverticula.

who has a contracted bladder, great urinary distress associated with pain, and a small amount of residual, to the patient who has residual urine that may vary from 500 to 1,000 c. c. to complete retention of urine. The amount of residual urine is not by itself necessarily a determining factor for resection. For example, a patient may have only two or three ounces of residual associated with great irritability of the bladder neck and a small bladder capacity, and yet suffer from painful urination with frequency, so that he is obliged to arise many times at night. Failure of the usual routine treatment to relieve the symptoms justifies advising resection.

RESIDUAL URINE

Complete retention	101 cases
500 to 1,000 c. c.	35 cases
250 to 500 c. c.	67 cases
	203 cases

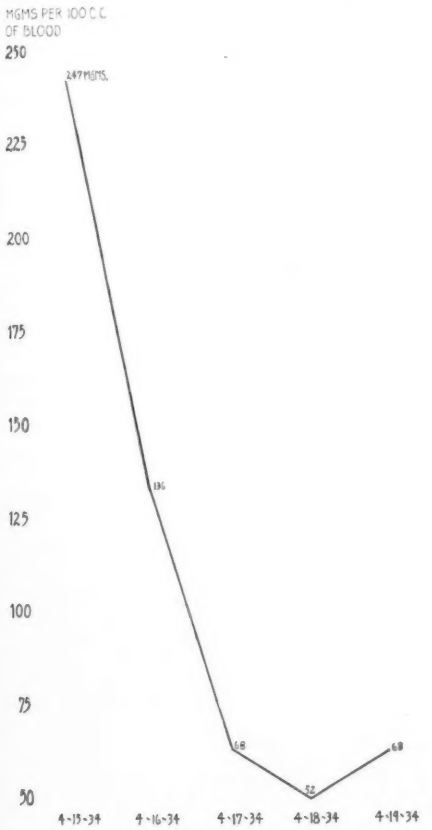

Fig. 4
Showing the rapid drop in blood urea following indwelling catheter drainage.

The importance of preliminary study of renal function should be emphasized just as much in cases in which a resection is planned as it is when a prostatectomy is planned; and renal function, when impaired, calls for treatment. As a rule, these patients respond well to treatment (*Fig. 4*).

All cases are subjected to careful study for the presence or absence of infection in the urinary tract. As may be expected in patients with obstruction and stasis, especially if long standing, who have had previous instrumentation, infection is often present. Hence, the necessity for preliminary treatment to clear up the infection cannot be too strongly emphasized. Bacteriological studies in these cases were of the routine sort.

In this series bacteriologic study of the urine showed the following:

INFECTING ORGANISMS

B. coli	156 cases
Staphylococcus albus	121 cases
Streptococcus hemolyticus	14 cases
Staphylococcus hemolyticus	8 cases
B. coli hemolyticus	15 cases
B. proteus	12 cases
B. pyocyaneus	4 cases
Eberthella	1 case
	331 cases

PREPARATION

The preparation of this group of resections was carried out as illustrated in the following table:

PREOPERATIVE MEASURES

Indwelling catheter	237 cases
Suprapubic cystostomy	35 cases
Massage and irrigation	61 cases
No preparation	162 cases
	495 cases

In the largest number of cases the indwelling catheter was used. With the use of a small soft catheter, passed without trauma, we have been able to prepare most of the patients. Frequent changes of catheter, urethral irrigation with potassium permanganate, and removing the catheter a few hours a day, often controls or prevents an impending catheter urethritis.

Thirty-five cases were prepared by means of a suprapubic cystostomy. In some of the cases a suprapubic cystostomy was done because of failure of the indwelling catheter drainage; that is, the development of profuse urethral bleeding, urethral pain and discharge, and the onset of chills and fever. However, resort to suprapubic cystostomy is becoming less and less frequent,

Fig. 5
Showing a large stone in the bladder with severe infection.

and during the past year only two patients were subjected to cystostomy for the above mentioned reasons.

In this series of cases there were 21 cases of stone in the bladder. The management of this group of cases varied and depended upon the number and size of the stones, the presence or absence of infection, and whether or not the infection could be cleared up by the use of the indwelling catheter. In some of the cases it was possible to remove the stones with litholopaxy. In the cases with small stones the litholopaxy was done at the end of the resection. In the cases of larger stones the litholopaxy was done first and catheter drainage carried out for a period of 48 to 72 hours before the resection was done. In seven cases a suprapubic cystostomy was done because of the size of the stones and because of the severity of the infection, and, finally, in some instances, because of failure of the indwelling catheter drainage for one reason or another to control the infection (*Fig. 5*). It is evident that no hard and fast rules can be laid down for the management of stone in relationship to resection, and that a little individualization is in order in outlining the handling of each case.

RECURRENCE OF STONE FOLLOWING RESECTION

The development of stone in the bladder following prostatectomy is an old story. However, formation of stone in the bladder following resection, as far as I am aware, has not been reported. I have recently seen two cases of stone in the bladder following transurethral resection. One patient had had a resection elsewhere. The other patient developed a stone in the bladder five months after I did a transurethral resection. In both cases the stone was removed by a litholopaxy.

In cases of carcinoma of the prostate a previous cystostomy was done elsewhere or by myself to relieve complete obstruction. All were resected and the suprapubic fistula allowed to heal.

In 13 cases preliminary cystostomy was done because of the presence of serious heart lesions, as a preliminary to resection, until the heart became stabilized.

THE USE OF THE RESECTOSCOPE IN HYPERTROPHY OF THE TRIGONE

Failure to recognize and relieve the presence of an hypertrophy of the trigone has been the cause of the persistence of residual urine, infection, and symptoms in a few cases following surgical removal of the prostate. Many of the members, I am sure, have resected the trigone at the time of the suprapubic prostatectomy. When this condition was found, I have carried out a resection of the trigone after the prostatic resection has been completed (*Fig. 6*). There has been no difficulty whatsoever in the three cases in which this was done.

ACCIDENTS OF RESECTION

There have been two intravesical explosions, with rupture of the bladder. Both cases were operated upon at once; both made an uneventful recovery. They were recently reported in the *Journal of The American Medical Association*.[5]

POSTOPERATIVE COURSE

Hemorrhage.—The subject of hemorrhage I would like to discuss under the following three headings: primary, secondary, and late secondary.

By primary hemorrhage is meant the bleeding at the time of the resection. There were five cases in this group, and in only one was it necessary to do a suprapubic cystostomy and pack. This case occurred early in the series

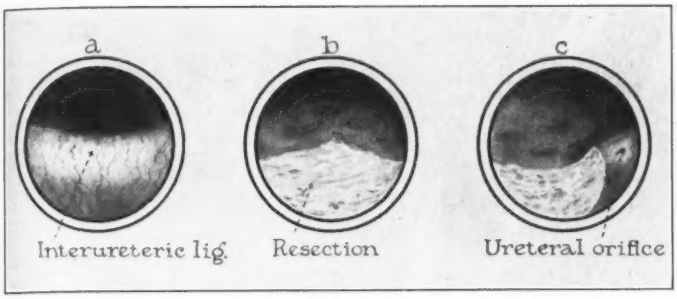

Fig. 6
(a) Showing the hypertrophied interureteric ligament.
(b) After resection of the hypertrophied ligament.
(c) Shows the ligament resected to the ureteral orifice.

and, no doubt, with more experience the bleeding could have been controlled with the resectoscope.

Secondary hemorrhage is due, no doubt, to infection and occurs from the tenth to the fifteenth day. These cases have given us no particular trouble. Clots when present are aspirated with the Bigelow pump and the bladder irrigated with a warm solution of potassium permanganate in the strength of 1:5,000, or a warm solution of silver nitrate in the strength of 1:5,000. This procedure controlled the bleeding in the majority of these cases. However, if the bleeding continues the resectoscope is introduced and the bleeding point is fulgurated or excised.

In the third group I have placed cases of so-called late secondary bleeding. There were seven cases in this group. In only two cases was the bleeding alarming and a resection of the bleeding points was done. This patient had had three resections. The second patient had a series of profuse bleedings six weeks after resection, which were controlled by fulguration. Twelve weeks after resection he again had serious bleeding, which was controlled by fulguration; a blood transfusion was given. The following table gives the number of patients who had postoperative hemorrhage.

HEMORRHAGE

Primary	5 cases
Secondary	12 cases
Late secondary	7 cases

Epididymitis.—Except in the younger patients vasectomy was performed routinely. Hence there were no cases of epididymitis. Prior to routine vasectomy the incidence was 12 per cent.

Fever. — In reviewing the temperature charts of these patients we were impressed by the fact that in fifty cases there was no rise of temperature. In the remaining 501 cases all had temperature. However, a study of these records shows that the temperature was short-lived, lasting on an average of 3.1 days. Further study showed that the number who had a high temperature was very small. The following table shows the postoperative temperature in this series.

POSTOPERATIVE TEMPERATURES

99 to 100 degrees	117 resections
100 to 101 degrees	188 resections
101 to 102 degrees	107 resections
102 to 103 degrees	49 resections
103 to 104 degrees	37 resections
104 to 105 degrees	3 resections
No temperature	50 resections
	551 resections

STAY IN THE HOSPITAL

Standing out in marked contrast to the long period of hospitalization attendant upon surgical prostatectomy is the relatively short period of hospitalization following electroresection. It goes without saying that necessarily there is a difference, as regards the length of stay, between the patients who have had a suprapubic cystostomy and those who have not had one. No attempt has been made to shorten the period of hospitalization. Especially in patients who lived out of town, this precautionary measure was never violated. In this series the shortest stay in the hospital was two days and the average period was 9.1 days.

MORTALITY

In this series there have been 551 resections. There were 18 deaths, making a mortality of 3.26 per cent. In the last 198 cases there were three deaths, a mortality of 1.5 per cent. In one case death was due to a stroke of apoplexy after the patient had left the table and had been placed on the cart. In the second case death occurred four days after resection, due to an acute coronary thrombosis. The third patient developed suppression on the third post-

operative day and died of acute dilatation of the heart.

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DISCUSSION (*Abstract*)

Dr. Nelse F. Ockerblad, Kansas City, Mo.—In discussing this paper it is necessary that one draw his conclusions on his own experience. One must not on the one hand be bound by prejudice nor on the other hand be biased by a view which may amount to self-deception.

I value Dr. Kretschmer's energy, ability and experience in thus massing this array of over five hundred cases of resection. That I cannot or perhaps will not duplicate his results probably is largely my own fault. In the presentations that have been given many times by many able urologists during the past three years, since resection became the vogue if not the obsession of the urologists, practically all of the arguments for and against resection have been printed. The answers to some of these controversial points will probably have to be left to posterity. Old Father Time will be the final umpire to decide which of us has been right. At the present time, the urological specialty as a whole is divided into three camps on the question of prostatic electric resection.

(1) The exclusive resectionists stand with Dr. Kretschmer on the motto, "Every prostatic a possible candidate for prostatic electric resection" and propose that all prostatic obstructions of whatever type are amenable to this form of operation.

(2) There are those who abhor resection as a dangerous, not to say futile, whittling operation not worthy of a specialist who has been trained to regard surgical principle as something almost sacred. The men of this group also hold that we are casting away our hard and recently won recognition as master surgeons, exchanging our birthright for a mess without the potage.

(3) The third group consists of the majority of the urologists of this country who value the new procedure for what it is worth and accept it as an aid to better urology, while at the same time realizing that the patient has a right to the best type of operation suited to his particular case. The members of this group are not swayed by the fact that the patient has already been "sold" on a simple closed non-cutting operation that will only lay him up a few days in the hospital and will be of lasting benefit and pleasure.

The third group recognizes the difficulties and the seriousness of this apparently simple procedure. From the number of bags, electrodes, forceps, clot evacuators, suction instruments, incontinence clamps and similar other trouble shooting equipment that has been manufactured and sold to the urologists of this land, I believe that it is impossible to convince the *Group 3* urologist that this apparently innocuous procedure is wholly bloodless, harmless or always successful.

In order that you may not feel that I am speaking on theory alone or as a non-resecting urologist, I will say that I have done over 250 prostatic resections in the past four years and during the same time have done over 225 other prostatectomies, or a total of 475 in four years. All but a few of the carcinomas fell into the resection group, as I only operated upon a few carcinomas in which I failed to make the diagnosis in advance. Twenty-eight per cent of the resections were in patients with carcinoma of the prostate, with eight deaths in the total series, a percentage of 3.2. In this group were all of the complications imaginable. There was no selection as to surgical risk. The only selection was the type of prostatic obstruction. There were two fatal hemorrhages and four other severe hemorrhages that required suprapubic cystotomy.

I shall not weary you with my own statistical report. I am merely trying to show that I have had some experience in this procedure. I am not at all impressed with the reports from large clinics that have not done a prostatectomy in years. I feel that some of us, including Dr. Kretschmer, will live to do prostatectomies on some of these cases that have been resected. The two-stage prostatectomy is still the safest operation in average hands and still produces the best average functional result. That prostatic electric resection is here to stay, I am quite convinced; that it will ever replace surgical prostatectomy of the open type is certainly not to be thought of. In Sir Henry Thompson's day it was thought that litholopaxy would entirely replace lithotomy, but a hundred years has passed since that time and litholopaxy is done only in selected cases, while suprapubic lithotomy is reserved for large stones in infected bladders. We may learn a lesson from this in the present controversy over the value of prostatic resection.

Dr. E. G. Ballenger, Atlanta, Ga.—Our own experiences coincide with Dr. Kretschmer's. During the past three years we have done only two prostatectomies, while we have done more than 400 transurethral resections. If the two prostatectomies had come later in our work, after we had acquired experience, they, too, could and would have been done transurethrally. While bleeding has been at times a troublesome factor, we have not yet found it necessary to do a suprapubic cystotomy to control it. As regards the permanence of the results after resections, we think that for benign cases this will depend almost wholly upon whether an adequate removal of tissue has been made. Postoperative bladder and kidney complications are greatly reduced by the thorough removal of obstructing tissue. This should be done a week or ten days after the first resection. I thank Dr. Kretschmer very much for being with us and for the clear-cut facts he has presented.

Dr. Jo C. Alexander, Dallas, Tex.—It was indeed a great pleasure to hear the distinguished guest relate his experiences with this procedure, for they so nearly agree with our own. My senior partner, Dr. Folsom, has, on previous occasions, made the statement that transurethral resection would practically supplant the open operation, and today I can say that we see no reason why that statement does not hold true, other than to make it read, "Transurethral resection in the hands of a few well trained men has supplanted the open operation." At the present time we have done about 375 resections, and during the same time only 3 prostatectomies. The results have been satisfactory. We do not feel that the type of gland is of such importance in the selection of the cases, but rather the experience of the operator. I do not believe it is fair for one to say that a certain thing is impossible only because he cannot do it himself, when others have demonstrated that any gland that will admit the resectoscope can be ade-

quately and satisfactorily resected. We agree with Dr. Kretschmer that in some of the larger glands multiple operations are better. However, we have removed 80 grams at one sitting, with very little shock to the patient. In reality, the large glands tax the surgeon's strength as much as the patient's, and for that reason we operate as a team, thus relieving each other at frequent intervals. We also feel that a better resection can be done that way, for often one operator will see obstructing tissue that the other one has overlooked.

TREATMENT OF MIKULICZ'S DISEASE*

By FRED M. HODGES, M.D.,
Richmond, Virginia

Mikulicz, in 1888, reported a case of bilateral enlargement of the lacrimal and salivary glands in a male 42 years of age. This disease, as understood and described by him, constituted a subacute or chronic bilateral enlargement of the lacrimal and salivary glands. The glands were firm and not tender on pressure. There were no definite constitutional symptoms and the general health was good. The changes in the glands were thought to be due to a low grade chronic infection. The blood was normal and there was no involvement of other organs or the lymphatic structures.

In his later work Mikulicz considered the condition a distinct clinical and pathologic entity. If seen early in the disease the lacrimal glands might be the only ones involved, but later there was always involvement of one or more groups of the salivary glands. Following Mikulicz's contributions numerous case reports appeared, especially in the foreign literature; some were true Mikulicz's disease, while many showed not only involvement of the lacrimal and salivary glands, but also involvement of the lymphatic structures, spleen, and so on, and various blood changes, especially of the leukemic type.

Some authors believe that all cases sooner or later turn out to be a form of leukemia and that the condition is a syndrome only.

MacCallum says:

"There is another condition essentially like an acute or subacute lymphoid leukemia in which tumor-like swelling of the salivary glands and of the lacrimal glands is very conspicuous. This is the so-called Mikulicz's disease, named for the distinguished Breslau surgeon who described it. We studied such a case at autopsy recently and found all the salivary glands and the lacrimal glands greatly enlarged and converted into masses of lymphoid cells in which the gland elements were widely separated."

Certainly anyone reading this description of the pathology of Mikulicz's disease by a distinguished pathologist would get anything but a clear conception of the true status of this condition.

The interstitial tissues of the salivary glands contain abundant lymphoid tissue and Kaufmann and many other pathologists feel that Mikulicz's disease proper and Mikulicz's syndrome have little in common. Kulbs found diffuse or focal lymphocytic infiltration, epithelial degeneration, giant cell formation, and considerable connective tissue, and he speaks of a chronic inflammatory process in true Mikulicz.

V. Brunn, Thursfield, Howard, and others have made more or less workable classifications, but Schaffer and Jacobsen have supplied the most complete and clinically the most satisfactory classification, which is as follows:

(1) Mikulicz's disease
  (a) Familial
  (b) Mikulicz disease proper
(2) Mikulicz's syndrome
  (a) Leukemia
  (b) Tuberculosis
  (c) Syphilis
  (d) Lymphosarcoma
  (e) Toxic
    (1) Lead
    (2) Iodides, etc.
  (f) Gout
  (g) Febris uveoparotidea subchronica

This classification alone shows definitely that the type of treatment indicated and the temporary and final results to be expected depend entirely upon the specific condition with which we are dealing.

So-called true Mikulicz's disease probably should be considered entirely distinct and unrelated to the various syndromes which closely simulate it. More careful study of a large series of cases may ultimately prove that in so-called true Mikulicz's there may occasionally be a slow transition into the more severe forms, especially leukemia, but the fact that the majority of these patients live for many years in good general health and without blood changes is entirely against this hypothesis. It is more probable that these instances of supposed transitions were atypical aleukemic leukemia, lymphosarcoma, or a related disease, from the beginning.

*Read in Section on Radiology, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

Our series of eight cases seen during the past 15 years represent, we believe, four of Mikulicz's disease proper and four of Mikulicz's syndrome. Of the syndrome group, *Case 1* was a white girl, aged 4, who had acute lymphatic leukemia. *Case 2* was a white woman, aged 48, who had subacute lymphatic leukemia. *Case 3* was a white male, aged 22, with Hodgkin's, and *Case 4* a white male, aged 27, with lymphosarcoma.

These were all advanced cases, were seen more than two years ago, and all terminated fatally, but there was marked temporary improvement, and relief of local symptoms following irradiation. Since a complete necropsy was not obtained in any of these I shall, through the courtesy of Dr. E. A. Merritt, of Washington, D. C., report in detail a recent case of this type.

Mr. Wm. N., white, aged 22 years, when first seen June 2, 1934, had for two months complained of general weakness and enlargement of the glands around the angles of the jaws. He was referred by a clinician to Dr. Merritt with the diagnosis of chronic mumps. He had enlargement of the lacrimal and parotid glands. There was other glandular involvement and the spleen was enlarged. The blood showed:

White cells	10,600
Polymorphonuclears	16 per cent
Lymphocytes	74 per cent
Large mononuclears	5 per cent
Lymphoblasts	2 per cent
Myelocytes (?)	3 per cent

The case was recognized as a typical Mikulicz's syndrome in a leukemic individual. The lacrimal glands showed a stony hardness. Under moderately heavy roentgen therapy the lacrimal and parotid gland enlargements disappeared within two weeks. The general disease, however, could not be checked, and postmortem on July 29 by Drs. J. W. Lindsay and E. C. Rice showed mainly hyperplasia of the thymus, mediastinal, bronchial, mesenteric and retroperitoneal lymph nodes, splenomegalia of the leukemic type, leukemic infiltration of the kidneys with hemorrhage into the parenchyma and leukemic infiltration of the liver. The postmortem diagnosis was lymphatic leukemia.

The four cases of true Mikulicz's disease were all in white women between the ages of 19 and 54 years. There was involvement of the lacrimal and salivary glands, especially the parotids, in all, but there was no other definite glandular involvement and no unusual blood changes. Three were free of symptoms or evidence of the disease after four, eight and nine years, respectively. *Case 1*, first seen in 1925, was free of all symptoms until lost sight of in 1929, when she moved to another city. *Cases 2* and *3* have been seen recently and are free of symptoms and in good general health. The fourth, which will be reported in detail, has had the disease for eight years and has been free of symptoms and evidence of the disease for six months.

Miss J. B., white, aged 54 years, had a negative family and past history except that she had suffered with more or less frequent colds and sore throat.

Fig. 1 Fig. 2

Fig. 1.—Mr. Wm. N. with enlargement of the parotid and lacrimal glands.
Fig. 2.—Same as Fig. 1, following roentgen irradiation.

About eight years before my examination she first noticed some enlargement of the right parotid. After about one month the swelling on this side disappeared and the left parotid enlarged. For about two years she had periodic attacks of involvement of one or both parotids. Six years previously both parotids, lacrimals and submaxillary salivary glands became involved and remained so until April, 1934, when she was first seen. Her general health was good.

Physical examination was negative except for enlargement of the lacrimal, parotid, and submaxillary salivary glands. There was no other glandular enlargement and the spleen was not palpable.

The blood showed hemoglobin 86 per cent, red count 4,500,000, white count 5,150, polymorphonuclears 72 per cent, lymphocytes 17 per cent, endothelial leukocytes 7 per cent, and eosinophils 3 per cent. The cells showed nothing unusual.

After two series of roentgen treatments the glandular enlargements disappeared and since June 1 she has been practically symptom free.

The writer, before the section on radiology of the American Medical Association, in May, 1925, reported the successful roentgen treatment of three cases of chronic parotitis.

We have not seen a typical case of uveoparotid fever or Heerfordt's disease where there is a subchronic parotitis and iridocyclitis, but Jackson, Hamburger and Schaffer, and others have reported excellent results following roentgen or radium therapy.

Two of our patients with Mikulicz's disease proper had seen numerous physicians in several different cities and had had almost every conceivable form of therapy except irradiation. Not once had any clinician mentioned roentgen therapy. They received such prompt and lasting relief from irradiation that they could not understand why this form of therapy had not been tried sooner. The reason for this must be due to the fact that the majority of observers confuse all cases with Mikulicz's syndrome, where there is not much chance of a permanent result except possibly in the rare forms due to tuberculosis or lues.

Igersheimer and Pollot, in a rather thorough study of 44 instances of true Mikulicz's supposed to be due to tuberculosis were able to prove tuberculosis an etiological factor in only three. Cases reported by March, Kulbs, Fleischer and Van Duyse all strongly suggested tuberculosis from the histologic picture, but none were proven cases of tuberculosis. This form is evidently very rare, though the histologic studies show changes more or less characteristic of tuberculosis.

Griffith believes that the influence of syphilis is questionable. Schaffer and Jacobsen believe that the incidence of syphilis is probably too high in their series and others in the literature to be purely accidental, but that the evidence is by no means conclusive.

Many radiologists have had no experience with Mikulicz's disease, for the simple reason that these patients have not been referred for treatment, in spite of the fact that Pfeiffer successfully irradiated a case of involvement of the lacrimal, parotid, and submaxillary salivary glands in 1906 and there have been numerous confirmatory reports, especially in the foreign literature, since that time. Two of our cases of true Mikulicz's were referred by one general practitioner, Dr. C. M. Caravati, who had seen a case previously.

Leucutia and Price cover the entire subject very thoroughly and report two cases of Mikulicz's disease proper and seven of Mikulicz's syndrome.

This latter group consisted of one aleukemic leukemia, one chronic lymphatic leukemia, one subacute lymphatic leukemia, two tuberculosis, one lymphosarcoma, one Hodgkin's. Their two cases of tuberculosis and one of Hodgkin's did not show enlargement of the lacrimal glands, though there was marked bilateral involvement of the other glands. Their two instances of Mikulicz's disease proper obtained good results, probably permanent after roentgen therapy. Those of the syndrome group responded for a time about as would be expected.

Many of the poor results from roentgen or radium therapy reported in the past were undoubtedly due to the small amounts of irradiation given. The cases of Askey and Hempelmann received only very small doses. Griffith's case of true Mikulicz's in a mulatto girl, aged 9, received without benefit systematic roentgen rays while in the hospital. The dosage factors and number of treatments were not given.

The treatment of the syndromes is naturally

Fig. 3 Fig. 4

Fig. 3.—Miss J. B. with enlargement of the parotid and lacrimal glands.
Fig. 4.—Same as Fig. 3, following roentgen irradiation.

the treatment of the primary disease in question, plus irradiation for the local manifestations in leukemia, lymphosarcoma, and Hodgkin's. The rare forms due to tuberculosis may or may not respond to this therapy and those due to syphilis should have antiluetic treatment. The removal surgically of the lacrimal glands has given good results when necessary. It, however, is probably very rarely necessary.

As Evans and Leucutia have shown, there is more differentiation of the cells in true Mikulicz than in leukemia, or lymphosarcoma, and since these cells are not so radiosensitive larger doses are necessary. We have used 200 Kv. 1 mm. copper and 1 aluminum, and have given at least 400 R (measured in air) at 2 to 3-week intervals for from 2 to 3 series, and in each instance with practically complete disappearance of the enlarged glands and symptoms. An early case treated with 125 Kv. 6 mm. aluminum filter and approximately 300 R for several series also gave good results.

RECAPITULATION

The two forms of the disease cannot be too strongly emphasized. In the first or Mikulicz's disease proper, though there may be an occasional apparent transition into leukemia, or a related disease, we are usually dealing with a condition of unknown origin, probably a low grade chronic infection with involvement of the lacrimal, parotid, and salivary glands, but without involvement of other organs or structures. Here irradiation usually gives prompt and more or less permanent relief of subjective and objective evidences of the disease.

In Mikulicz's syndrome the involvement of the lacrimal and salivary glands is only one manifestation of a general disease, and though irradiation gives excellent temporary results in the majority of cases, final results depend upon the specific disease with which it is associated.

CONCLUSIONS

(1) Mikulicz's disease proper is a definite clinical and pathologic entity which responds more or less permanently to proper roentgen therapy.

(2) It is probably much more common than is generally supposed, due to the fact that it is frequently unrecognized.

(3) Mikulicz's syndrome is probably in no way associated with Mikulicz's disease proper, and is only a local manifestation of a general disease, most often leukemia or lymphosarcoma.

(4) Here, also, roentgen therapy offers excellent temporary results. Final results are dependent entirely upon the specific disease with which it is associated.

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DISCUSSION (*Abstract*)

Dr. R. H. Crockett, San Antonio, Tex.—I have now under treatment a case that is clinically Mikulicz's disease. In January, 1934, both submaxillary glands enlarged as though the patient had mumps. Four months later, in May, the patient came to me with one submaxillary about an inch in diameter and the other about one-half inch in diameter. The swelling had gone up and down ever since it had first appeared, but never entirely regressed. I considered that some sort of a subacute infection was present and advised x-ray therapy. I gave her 102 P. Kv., 5 ma., 3 aluminum filter, 10 inches distance, four minutes, every two weeks. After the second treatment, I increased the time to six minutes, which produced a much better regression in the size of the glands than the four-minute time. Six minutes on my machine, with this set-up, equals approximately 200 R units, and is about one-half of an erythema.

After eight x-ray treatments, the glands have gone

down to almost normal in size, with absence of all previous pain. In the center of each treated area there is still a small cheesy nodule, about 10 per cent of the original size of the gland. I am now slowing up the x-ray treatment to once a month.

Dr. R. T. Wilson, Temple, Tex.—It has not been my privilege to have any experience with this rare condition which Dr. Hodges discusses. It is another illustration of the ever enlarging field of radiation therapy which we as radiologists are facing, and simply serves to teach us that we should be alert to the possibilities in all these infectious and inflammatory diseases. When one reviews the long list of inflammatory processes that have apparently been successfully treated by radiation, he is amazed with the scope of its application. The warning which we should observe is that we will not fall into the error of regarding radiation as a cure-all and attempt to apply it where it is not indicated. However, on the other hand, one is tempted, when meeting some new or strange situation, to give radiation a trial, especially in diseases where other therapy has not proven satisfactory.

Dr. C. P. Rutledge, Shreveport, La.—I have seen and treated three cases of Mikulicz's disease within the past fifteen years. In none of these patients could we establish a diagnosis of Hodgkin's, leukemia or lymphoblastoma, so they were classified as Mikulicz's and given x-ray therapy with good results.

I should like to ask Dr. Hodges if any of his cases showed a ptosis of the eyelids. I had one such case which was thought possibly to be a syphilitic, but all tests for syphilis were negative.

MALIGNANCY OF THE UPPER MAXILLA*

By HOMER DUPUY, M.D.,†
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Our Charity Hospital records give very vague and unsatisfactory data of the treatment employed in the last twenty-five years for malignancy of the upper maxilla. In our service we seem to have broken into an untried field within the last five years in this section of the country. Difficult problems have been encountered. We are trying to master them. My group of assistants is greatly encouraged by our results. Our slogan is, "No compromise with malignancy." No less an authority than Dr. Bloodgood, who observed some of our results, gave us inspirational words of praise. We thank him. This contribution is based on a series of 24 cases. We present the following clinical, anatomical, microscopic, and surgical data.

The ages ranged from eight to sixty-five years. (The youngest, W. F., aged 8, had sarcoma of the antrum, recurrence, and died.) In our series of twenty-four cases three were not operated upon because of extensive regional adenopathy. These patients died, leaving twenty-one patients operated upon. Of this latter group five died, from recurrence with lymph node metastasis. Colored patients, females, predominated in numbers. Sixteen patients are still living after operation.

DURATION OF LIFE AFTER OPERATION

Number Cases	Years Since Operation
1	5
6	4
5	3
2	2
2	4

Text-books and the medical literature have not stepped up to some of the clinical and surgical data already reported from our service, Charity Hospital. Our most important observation gives definite evidence that malignancy of the upper maxilla, with its adjoining structures, is extraordinarily tardy and late, in metastatic involvement of the lymph nodes in the neck. Is it due to a sparse supply of lymphatic connections? Or is it the type of tumor based on the histological features? We are not yet prepared to answer these questions. But facts are stubborn things, even when unexplained. With no regional adenopathy, surgery, and other measures already mentioned offer great possibilities for permanent cure. In our 24 patients the majority reported that the swollen cheek, alveolar and hard palate infiltration dated from six months to one year. Only in four patients did we observe extensive metastatic adenopathy. We considered surgery futile. Notwithstanding deep x-ray, and radium, no cures resulted in this group.

Biopsies were done either preoperatively or by rush section at operation.

All tumor tissue was referred to the Department of Pathology.

Dr. Rigney D'Aunoy, pathologist, reports:

5 specimens sarcoma
19 specimens carcinoma

With but three exceptions, all our patients showed dental disease, such as carious teeth, neoplastic tissue in the sockets of previously extracted teeth, or infiltration of the alveolar process.

Many patients did have several upper teeth extracted on the affected side. The dental

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Fig. 1
Carcinoma alveolar process, hard palate, antrum. No preoperative metastasis. Operation three years ago. No recurrence.

trouble always formed part of the history, especially among the negroes, in whom dental hygiene is positively neglected. With the antrum always implicated in malignancy of the upper maxilla, we have been considering two routes of primary extension. One from the antrum, particularly when the upper premolar and molar roots, by anatomical anomaly, project into the antrum. Cancer cells may also travel by way of the blood and lymphatic vessels from the antrum into the dental structures. Vice versa, pathologic changes in or around the teeth may prove the irritation factor in the flare-up of possible latent cancer cells in the antrum and contiguous parts. Which is primary? That is the question. But we have, in our series of cases, obtained strong evidence, clinically and surgically, of a close association between the antrum and dental organs, in malignancy of the upper maxilla.

Based on clinical findings and direct examination during operation, we have classified five regional anatomical groups of malignant invasion of the maxilla.

(1) Whatever parts were affected by carcinoma or sarcoma, there was always involvement of the antrum.

(2) The majority of cases showed dental disease, such as carious teeth, tumor tissue in the sockets of extracted teeth, or infiltration of the alveolar process.

(3) Some showed extension in the orbit, the roof of the antrum, partly forming the floor of the orbit, being destroyed by the large tumor mass in the antrum.

(4) In some there was infiltration of the hard palate, usually associated with the same condition of the alveolar (*Fig. 1*).

(5) In one case the secondary invasion of the malar or zygomatic bone had already extended to the temporo-mandibular joint. (Despite radical surgery, this patient died from recurrence in the temporo-mandibular area.)

We have been helped by this anatomical grouping in deciding what type of operation should be applied: partial or complete resection of the upper maxilla.

SURGICAL CONSIDERATIONS

In our series of cases the anatomical parts more frequently affected by the malignant invasion were: the antrum, alveolar process, and palatine process. Our surgical technic seldom includes removal of the malar bone or the frontal process. We usually practice a partial resection of the maxilla. In two cases the eye itself and adjoining structures being involved, we enucleated the eye as part of our resection (*Fig. 2*). In our series the antrum always

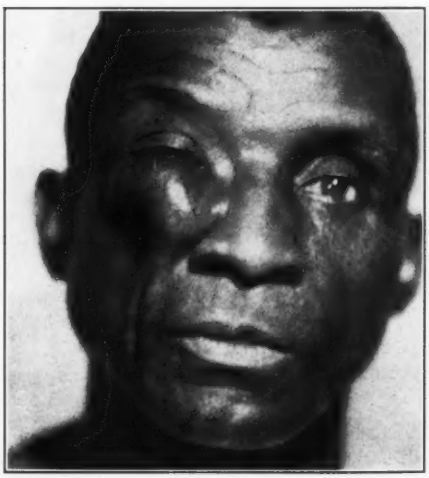

Fig. 2
Carcinoma right antrum, one of group showing extension upper region. Operation two years ago. No preoperative regional metastasis. No recurrence.

showed tumor tissue, usually with infiltration of the alveolar and palatine processes. This necessitated removal of the whole anterior wall of the antrum, the alveolar, and one-half of the hard palate. Resection of the upper maxilla is accompanied by profuse bleeding. To cope with this ever-present complication of profuse bleeding, our first step is a tracheotomy, under local anesthesia. The breathing avenue established in the lower air tract removes the possibility of blood entering the upper and lower air passages, with immediate or postoperative fatal asphyxia. Such an event must be considered. The suction apparatus or sponging cannot compare as a safety measure with massive gauze-packing of the whole pharyngeal and upper laryngeal areas. Such packing shortens the time of the operation. It allows deliberate control of the bleeding by ligature and pressure sponges in the field of operation. Immediately after the tracheotomy we give ether through a soft rubber catheter, by way of the tracheal cannula. With proper care and frequent cleansing of the cannula, we thus far have had no postoperative lung infections.

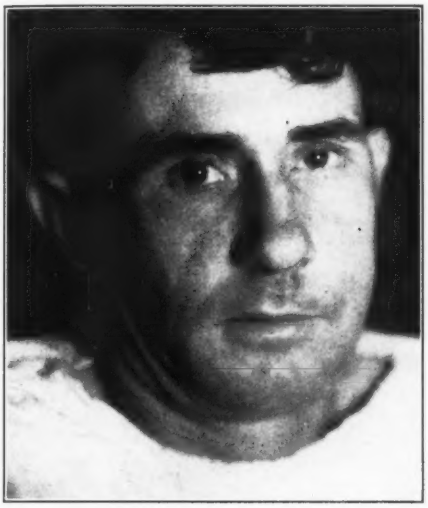

Fig. 3
Sarcoma left antrum. Partial resection maxilla, as described in paper. Operated three years ago. Showing average cosmetic results.

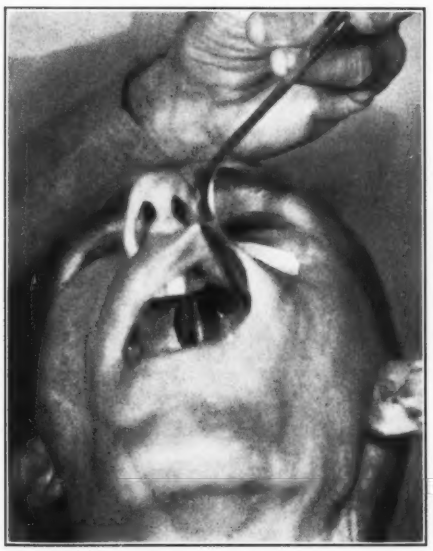

Fig. 4
Sarcoma, left antrum. Operation three years ago. Showing mouth wound. No recurrence. No regional adenopathy.

As reported in the *Southern Medical Journal* for April, 1932, we used experimentally and successfully sodium amytal intravenously for general anesthesia in quite a number of these cases. We will report on our experience with this drug. Its administration requires training and experience.

Briefly, our operative technic is as follows: a triangular flap is obtained over the facial surface by two deep incisions to the bone, one horizontal, about one-half an inch below the lower eyelid; the other vertical, close to the outer side of the nose, from below the inner canthus to the lower margin of the anterior naris. This triangular flap is dissected and

Fig. 5
Dr. Sidney Tiblier, Visiting Dental Surgeon, Charity Hospital, New Orleans, suggested and made a dental plate to cover mouth wound. Normal voice and food intake. Small fistula over cheek will be closed by a plastic.

pulled far below the alveolar process. We do the resection with large chisels, one-half to one inch in width. Rapid work is accomplished with chisels. By this means the bone structures are removed as one total mass. Then begins the stage of greatest bleeding. We control this with the galvano-cautery, and further apply it to any remaining tumorous tissue. Before applying the cautery we surround the operative field with water-soaked sponges. With this precautionary measure no ether accident has yet occurred. The facial surface flap is completely sutured. This accounts for our good cosmetic results. Nasal tube feeding is employed for a few days. The tracheal cannula is generally removed in one week. The large postoperative wound in the mouth is used for future dressings and the application of radium. One 50-mm. tube, 400 mm. hours, is inserted through the postoperative opening in the mouth. We apply radium several times at one-month intervals.

We acknowledge the valuable cooperation of our staff: Dr. Spencer McNair, Dr. C. Pipergerdes, Dr. D. Palmisano, and Dr. Jeanne Roelling.

DISCUSSION (*Abstract*)

Dr. John T. Crebbin, Shreveport, La.—Malignancy is no respector of persons or station. Young and old are affected alike. Unfortunately, this disease is greatly on the increase, and is far outstripping our feeble efforts to control it. No set line of treatment appears to have made a great impression.

Doubtless, we have all tried various and sundry treatments for this disease. Surgery has been and is still being used by many with various results. X-ray and radium are also of incalculable value. The essayist's records with surgery are better than mine, and better than the reports of other surgeons.

Unfortunately, malignancy of the maxilla is seldom seen early, for this disease has usually progressed considerably before the patient applies for relief.

In our Shreveport Charity Hospital Tumor Clinic our records show a ratio of four cases of carcinoma of the antrum to one of sarcoma. We have practically discarded surgery in most cases, using instead high voltage x-ray therapy, the Coutard method of protected fractional x-ray doses.

This is heavily filtered x-rays. Each patient receives treatment every day for from fifteen to twenty-one days. Radium is used in some of our cases. However, the fractional x-ray doses are proving most satisfactory in our hands.

Absolutely no line of treatment should be undertaken until a biopsy has been made. Early and energetic treatment is then indicated if we hope to control this disease.

Dr. Charles J. Boehs, San Antonio, Tex.—I have seen very few cases of this type, and those were in the last stages.

To my mind, the two outstanding features of Dr. Dupuy's essay are first the fact that these malignancies are predominant in the negro race, and second, that the glands of the neck seem to be little involved in the line of metastasis.

The essayist has demonstrated a step forward in the treatment of this form of malignancy.

Dr. Joseph C. Beck, Chicago, Ill.—There are several points on which I am at variance with Dr. Dupuy's views. The main objection that I find in the work is the lack of presentation of the pathologic diagnosis of these neoplasms. It is not sufficient to say that a case was malignant and was sarcoma or carcinoma, but we must go into greater detail as to the type of cells present: in other words, the grade of malignancy that a particular biopsy or result of pathologic examination of the growth shows.

In the light of modern therapy, both surgical and radiological, much of the present day thought along those lines is also omitted from the paper. This is probably due to the fact that Dr. Dupuy did not have the time to go into the details of this subject. I trust that when he publishes his paper he will include the findings and the treatment that was instituted in order to complete a very fine presentation of cases.

The prosthetic portion of the work is really of the utmost importance and should be described in detail. Although we personally do not make these protheses, it is through our aid and insistence of their application that the patient is made happier after the radical operation which cancer about the upper maxilla requires.

Dr. William V. Mullin, Cleveland, Ohio.—As I listened to Dr. Dupuy's paper, I made notes for my own information and, like the two previous discussors, I had jotted down the value of ligating the carotid before operation. So far, the advantage of electrocoagulation has not been mentioned in handling these cases. I think it is an ideal method of dealing with them. I also think radium should follow all surgical procedures and that the antrum should be kept open for a year or more so that it can be thoroughly inspected on account of the possibility of any recurrence.

Dr. Dupuy (closing).—In cases where radium and x-ray were applied before the case was referred to us, surgery was the final procedure. Patients referred to our clinic showed extensive regional malignancy. Why so few metastases of the contiguous lymph nodes? The type of tumor cell, its histological features, may be the answer to this question. With the assistance of Dr. D'Aunoy, pathologist of the Charity, we shall analyze these histological features and report in a future contribution. Our slogan, "No compromise with malignancy;" surgery first, then radium and x-ray, postoperatively, has certainly in our series of cases given very encouraging results.

BONE TUMORS*

By Robt. D. Schrock, M.D.,†
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The purpose of this presentation is to recount a limited experience in the diagnosis and treatment of bone tumors; to gain aid; to show reasons for some errors; to show reasonable incompatibility between clinical and pathologic opinions, and to stress the concept that tissues in bone tumors, both benign and malignant, do vary in character as they may be influenced by biologic variations of their host.

The bone tumor problem is that of new growth in mesenchymal tissues, and of these in the highly specialized salt-infiltrated structures. The answers to these abnormal cellular activities will be developed concurrently with the solution of the problems of new growth in soft tissues. Growth stimulating and inhibiting factors cannot be essentially different in these structures.

A resumé of the present conception of the etiology of cancer may not be out of place. A final footnote is quoted from Egger's Monograph on "The Etiology of Cancer."

"In a rather recent summary of his views, Auler expressed the belief that cancer may result from a number of different mechanisms. Among these he included: embryonization of cells, cellular isolation which may result from anomaly, trauma, chemical irritation, senility, chronic inflammation, hormonal abnormality, etc., factors of individual predisposition with, in his opinion, contributory to this an element of intestinal abnormality that results in intermediate products of polysaccharide digestion which in turn interfere with the cleavage of the monosaccharides; other elements such as increased alkalinity of the blood, a relative increase of potassium salts and an altered content of fibrinogen and globulin in the blood and anaphylactic disturbances affecting the nerve and hormonal supply to the part involved."

The early concepts of Cohnheim and Virchow combined in the more elaborate Fischer-Wasels presentation, are in accord with the present day theories of the cause of cancer. With so many physical, chemical and tissue variants the 1934 concepts are all-inclusive. Theories are essential to progress, insofar as they serve as depositories for facts proven and presented by contentious scientists. Comtemplation of these contentions is stimulating. They may point to profitable detailed investigations in individual problem cases.

Growth of tissue is accomplished through cellular activity normally under balanced physiologic growth-restraining factors. With imbalance of growth restraint, general or local hyperplastic or hypoplastic changes occur. In certain generalized skeletal dyscrasias definite vitamins and hormones are proven elements producing growth imbalance. This proof of causative factors and consequent therapeutic advance has resulted from intensive study and correlation of individual cases.

In the field of bone pathology the set-up for this correlated study has been admirably made in the Registry of Bone Sarcoma directed by an outstanding committee of the American College of Surgeons. Kolodny's study and monograph of the 700 cases available in 1927 is an excellent example of the opportunities offered by this centralizing activity. If 10 per cent of the bone tumors of the United States were recorded in accurate detail the amount and quality of material would be tremendously increased. The diagnostic facilities of this organization can be more frequently utilized in attempts at more accurate diagnosis and for suggestions as to therapy, promising most for the patient.

The classification of bone tumors offered by the Registry cannot be accepted by all clinicians, radiologists or pathologists. Doctors of medicine express their "rugged individualism" by insistance on modification, for better or worse, of any technic or classification to suit their personal ideas or demands. Universal agreement on symptoms or terms would be Utopian. However, this simple classification, carefully prepared by erudite, experienced clinicians and pathologists, serves well as a grouping into which may be placed all bone tumors, as they are now known. The system is sufficiently elastic to meet the needs as further knowledge may be acquired. It is understandable. For the present there is a common ground for intelligible nomenclature.

From the clinical standpoint there are bone tumors indubitably benign, and others as certainly malignant. Between these groups is a great array of bone growths whose present activity is not discernible and whose future conduct is hardly predictable. They are suspicious citizens of the community. Dr. Ewing's "precancerous" concept has a place here, as well as in epithelial structures. Early discovery of bone lesions is more difficult than finding of the early superficial lesions.

It is the intermediate group in which greater

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

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Fig. 1

E. B. Ewing's tumor, fibula. Circumference reduced 5½ inches by deep x-ray therapy. Later: metastasis and death.

general experience is sorely needed. Analysis of the history and clinical findings, the x-ray studies and the microscopic examinations of adequate material should lead to combined opinion of value. Accuracy in diagnosis and effectiveness in therapy are directly in proportion to the carefulness, experience and judgment of the combined consulting group, clinician, pathologist and radiologist.

RULES OF PROCEDURE FOR BONE LESIONS

By *Joseph Colt Bloodgood, M.D.*

(Rearranged with permission and apology)

(1) Complete
- (a) History, personal and family
- (b) Physical examination, local and general
- (c) X-ray and clinical laboratory findings

(2) X-ray study
- (a) Of all traumatized bone
- (b) Of single lesion, repeated and comparative in various planes
- (c) Of corresponding normal segment
- (d) Of other bones for multiple lesions
- (e) Of chest and pelvis for early metastasis; also lateral of skull; teeth
- (f) Therapy early, if necessary as a time-killer, if suspicion of malignancy (200 Kv. machine)
- (g) Therapy discontinued if beneficial results not evident in two to three weeks

(3) Clinical laboratory study
- (a) Temperature at regular intervals over adequate period
- (b) Urine, especially for Bence-Jones bodies and excess calcium content
- (c) Blood counts, complete and at intervals
- (d) Blood Wassermann
- (e) Blood chemistry to include sugar, serum Ca and P and phosphatase
- (f) Metabolism studies

(4) Bone tumor biopsy
- (a) Rarely, if ever, an emergency
- (b) Not permissible where facilities for preparation of material not available
- (c) Desirable to have pathologist and radiologist in attendance
- (d) Technic; aspiration (Martin and Ellis), (Stewart). Excision of adequate material
- (e) In dubious cases, opinions from consultants of wide experience (Registry of Bone Sarcoma)

(5) Attitude of physician toward patient
- (a) Artistic approach in methods of obtaining opportunity for adequate study.
- (b) Avoid expression of opinions until definite plan of action can be determined.
- (c) Avoid mention of surgery or possible amputations until adequate mental preparation of the patient is accomplished.
- (d) Avoid activity of patient by rest in bed; or splints and sling for upper extremity and crutches for lower

Fig. 2

K. K., aged 24. Giant cell tumor, metaplastic. Malignant changes postoperative. Amputation.

Few clinical men are now without the facilities for accomplishing the major part of the indicated investigations. Most pathologists are less familiar with the intimate alterations in bone than in soft parts. Difficulties of preparation and interpretation are greater. The more involved technical work and the highly specialized radiation therapy need be placed in competent hands. The more modern accurately calibrated x-ray machines are required for adequate dosage. Stimulation of tumor growth is not uncommon from low dosage. The biologic reaction of the individual patient to irradiation is a variable factor to be evaluated by the radiologist with increasing experience in therapeutic dosages. Radiation therapy has reached the stage of exactness in unit measurement, and to this exactness clinicians must be sensitive.

From the therapeutic angle is to be determined a choice of attack between surgery, x-ray and radium. In bone tumor therapy the use of radium is rendered more hazardous by the incompletely closed wound and the added danger of infection. The advantage of radium over x-ray is not proven. In many of the radiosensitive tumors x-ray therapy offers as great a chance of success as surgery. In general the benign tumors are surgical; also in the intermediate group where total excision can be accomplished without production of great dysfunction, surgical removal is better. In very early small malignancies where continuity of bone can safely be maintained, surgery is preferable. In the more advanced malignant cases trial by x-ray is the method of choice, with amputations reserved for the relief of pain and continuation of limited activity by the patient.

Increasingly improved irradiation technic with greater experience on the part of the radiologist, is now swinging therapy a little to its side. However, we can hardly hope for a great benefit except in those tumors, highly vascular and of marked embryo-like cellular structure. The effect of x-ray is essentially to produce sclerosis of capillaries and hasten the over-ambitious embryonal cell to the stage of judicious and inactive senility.

This study is based on 64 patients personally observed. The records and examinations, both clinical and pathologic, fall far short of the requirements suggested by Dr. Bloodgood. The results are probably comparable to those of clinics and teaching hospitals hampered somewhat by lack of personnel and adequate endowment.

In our group of malignant tumors there are no patients alive beyond three years; those with Ewing's tumors have died within two years or less; three giant cell tumors have shown malignant changes after operative attack; one of these was suspicious in the biopsy specimen. In two simple bone cysts and one benign giant cell tumor, where removal would produce great dysfunction, immediate bone grafting operations have been performed.

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Fig. 3

W. R. M., aged 25. Giant cell tumor, complicated by pathologic fracture. Resection with immediate bone graft.

SURGICAL MANAGEMENT OF DESTRUCTION OF THE COMMON BILE DUCT WITHOUT BILIARY FISTULA*

By FERDINAND P. HERFF, M.D., F.A.C.S.,
San Antonio, Texas

Continuance of life for any considerable length of time, in the face of complete interruption of common duct patency without either internal or external biliary fistulae, or secondary ducts, is a medical rarity. Cameron and Oakley have recently published an extensive review of experimental ligation of the common bile duct in animals. The sequence of such section is stasis, distention, vascular disturbance, sclerosis and parenchymal atrophy. Although this observation is based upon animal experimentation, to a great extent we may apply its principles to the human. If the flow in the common duct is interrupted the subject suffers in three definite ways:

(a) There is interference with digestion and assimilation due to absence of intestinal bile, also of pancreatic juice, provided the ampulla is destroyed.

(b) There is interference with intrinsic liver functions, due to pressure and parenchymal atrophy.

(c) There is toxic irritation of the viscera by the high icterus index.

There is also a possibility of secondary septic processes.

Most animals die promptly after such ligations, although one rat lived 338 days after the duct was tied. It was found, however, that in this animal the common duct had enlarged to form a sac as large as a tangerine. Apparently in those cases where there was no formation of such receptacles death ensued earlier. The above mentioned saccular enlargement probably served as a cesspool for the bile, thus affording a type of drainage. It is possible, however, that rarely a balance results in the trinity of bile secretion, bile absorption by the blood, and bile elimination from the blood, as indicated in the case we report.

The presence of fistulae alters the situation. External fistulae do not bring up the problem of parenchymal atrophy and bile toxicity, but merely concern us with inanition as a result of digestive disturbances, and perhaps with septic upheavals. Fistulae into the stomach or intestine may restore a fairly normal physical arrangement and may spell cure, except for the ever-present danger of ascending cholangeitis. Common duct restoration, of course, can be made more dependable if it is feasible to employ the ampulla of Vater as our point of entrance into the bowel, although this possibility is usually eliminated when we are dealing with neoplasms.

The case we present is of interest because before restoration our patient had lived for nearly seven years without the secreted bile's having egress from the hepatic duct except through blood absorption; because of the seemingly perfect result 30 months after reconstruction, despite the fact that most authorities condemn the simple operation employed; and, finally, because of the demonstration that apparently recovery was made, although the viscera had been punished to an apparently irreparable degree.

There are several general methods of restoration of bile duct function where cholecystectomy has previously been done:

(a) Utilization of an external fistulous tract by transplanting the duct into the duodenum.

(b) Anastomosis of the proximal duct end to an intestine or to the distal duct end.

(c) Plastic tubular reconstruction of the duct, using gastric or peritoneal flaps.

Mobilization of the duodenum, allowing a direct or a distal duct anastomosis to the hepatic or remaining portion of the common duct, seems to be the method of choice. Still, there are cases

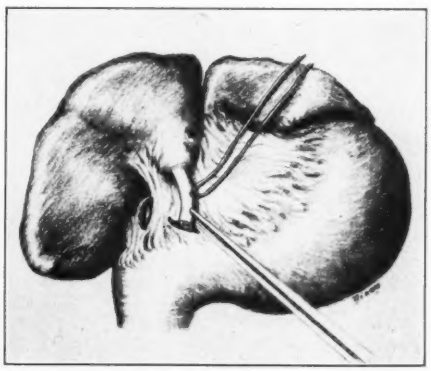

Fig. 1
Hepatic and duodenal duct ends have been opened. Molding tube being inserted.

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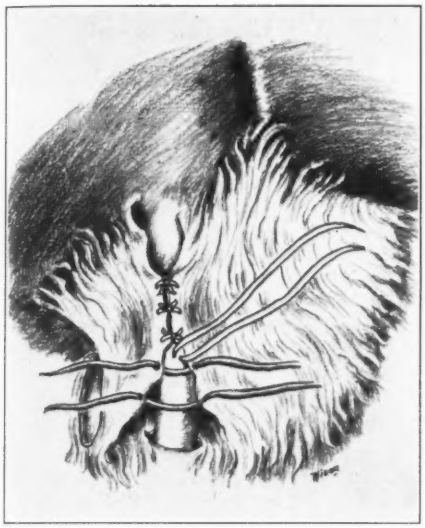

Fig. 2
Molding tube being implanted. Fixation string shown.

where such an anastomosis is not feasible due to the impossibility of mobilizing the duodenum properly. An attempt at union under these conditions would produce tension and a bad result. We believe that under the above mentioned circumstances, or when we have a patient who is *in extremis*, the simple expedient of carrying wide folds of the gastrohepatic omentum over a molding rubber tube must be considered. This statement applies particularly to traumatic destruction of the common duct where the ampulla remains accessible and usable and the patient still enjoys the use of his pancreatic juice.

CASE REPORT

In 1924, Mrs. R. A., aged 60, after recurrent attacks of biliary colic, was operated upon for stones and empyema of the gallbladder. Cholecystectomy was done. Previously she had never suffered jaundice. Three days later intense pain and jaundice began. The latter became marked and continued until our duct reconstruction seven years later. The wound drained no bile; the stools became acholic; pain was almost constant with paroxysmal exacerbations; loss of weight was steady; the urine was coffee-colored; and weakness was progressive. Presumably the patient had suffered accidental operative trauma of choledochus communis. Considered too bad a surgical risk for reconstructive work, she was not operated upon until 1927, when she developed intestinal obstruction with a mass in the right upper quadrant. Her abdomen was opened and intestinal obstruction relieved. Jaundice and acholic stools continued. It is questionable whether there was bile leakage following this laparotomy, but even if there was, the drainage fistula closed entirely in three months. From then until May 14, 1932, the patient remained fistula-free, declined progressively and came under our care showing the following picture:

Extreme asthenia and emaciation (she had lost forty pounds); rapid, thready pulse; temperature subnormal to subfebrile; cardiac action weak; and blood pressure 88/62. Urinalysis showed: granular and hyaline casts, heavy bile, pus and albumin. The hemoglobin was 58 per cent, red cells 2,500,000, white cells 4,500 with mononuclears predominating. She was so jaundiced as to be mahogany colored; the sclera were brown; icterus index was 80; and blood sugar 80. Stools were completely acholic. The patient was unable to raise her head from her bed. She presented a large inoperable postoperative ventral hernia.

Against our better judgment we operated (under 150 mg. spinal procaine hydrochloride anesthetic). Diffuse, dense adhesions massively plastered part of the stomach, duodenum, colon and omentum to the under surface of the liver. The duodenum resisted all reasonable efforts at mobilization. With difficulty we encountered the edge of the foramen of Winslow. Toward the liver we felt a slight bulbous enlargement of the hepatic end of the duct, which we aspirated, encountering bile. The distal end of the severed duct was palpable, but not dilated. Again we aspirated, drawing out pancreatic juice. We opened the distal and proximal duct ends thus demonstrated. These free openings were found to be 1¾ inches apart. Into these two respective openings we inserted the ends of a ¼-inch external diameter rubber molding tube, midway to which was fastened a fixation string consisting of a strand of silkworm gut passed through a small segment of the upper surface of the tube's circumference. The two free ends of this silkworm gut were temporarily clamped by a hemostat. Care was taken to carry one end of the tube as high up into the hepatic duct as possible and the other end

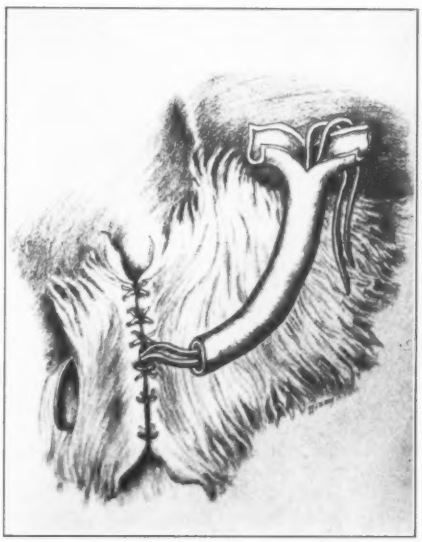

Fig. 3
Invagination completed. Fixation string being carried through drainage tube.

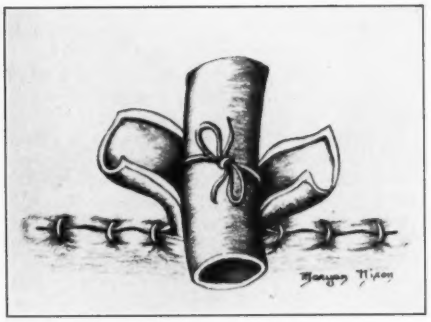

Fig. 4
Fixation string ends bow-knotted externally over segment of rubber tube.

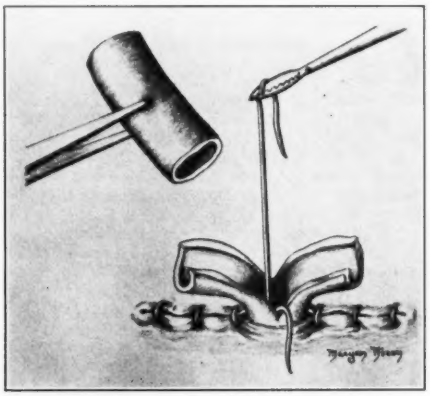

Fig. 5
Fixation string being withdrawn followed by removal of drainage tube.

down into the distal end of the common duct, so that it penetrated through the ampulla into the duodenum. We then passed interrupted No. 1 chromic catgut sutures into the gastrohepatic omentum, each suture entering and emerging respectively on opposite sides of the molding tube, our needles being inserted well away from the tube in order to insure wide flaps. Flap edges were scarified, sutures tied and a satisfactory reconstruction resulted. The fixation line ends were then carried through a 5/16-inch drainage tube which led out through the closed incision. The end of the protruding drainage tube was split lengthwise, forming a fork into which a section of large soft rubber tubing was placed perpendicularly across the incision line. Over this latter tube the silkworm gut ends were bow-knotted.

The patient was very ill for four days. On the fifth day some color appeared in the stools. On the tenth day the urine grew lighter, quantity greater; casts and albumin lessened; the sclera and skin surface were less jaundiced. The patient improved rapidly, developed an appetite, had very light pains and at the end of two weeks had normal bowel movements. The sclera and skin had markedly cleared and the urine assumed a nearly normal state. After twenty-one days the patient was entirely convalescent. The fixation line and drainage tube were then withdrawn. The wound was closed without biliary leakage. Final recovery was uneventful and the patient enjoys normal health thirty months after reconstruction.

Although the stools were diligently searched, the molding tube was not found; but unquestionably this tube passed out through the bowels, since it was roentgenologically shadow-casting, and several skiograms failed to reveal its presence.

CONCLUSIONS

(1) There is no set rule for surgical management of a destroyed common duct. Each case is a law unto itself. Procedures depend upon personal judgment, and methods condemned by one may prove effective in the hands of others.

(2) Admittedly, approximation of the severed duct end to the gut, or duct end to duct end, is the ideal method, but the laws of tension must at all times be respected, for which reason both fistula transplantation and tube enfolding are occasionally indicated.

(3) Success in the invaginated tube technic depends upon:

(a) Preservation of endothelium covering the field upon which the tube is to be implanted.

(b) The use of a comparatively large, barium-treated, non-collapsible, pliant, molding tube.

(c) Wide interrupted stitches, not too many.

(d) Thorough scarification of flap edges.

(e) Fixation of invaginated tube for at least three weeks.

(4) This case is unique because the patient lived over seven years without biliary drainage except for a possible interval of three months. Nature had apparently balanced bile secretion, absorption of bile by the blood, and elimination of bile from the blood.

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EMPYEMA IN CHILDREN
WITH AN ANALYSIS OF 103 CASES*

By J. M. MASON, M.D.,
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The 103 cases of empyema embodied in this report, embrace all empyema cases treated in the Children's Hospital and in the children's wards of the Hillman Hospital from January, 1929, to September, 1934, except nine cases from the Children's Hospital during January, February and March, 1929, which were included in a previous report from that institution.

The cases were so evenly divided in number between the two hospitals and are so closely parallel in all statistical respects that they will be reported together.

Table 1

ADMISSIONS BY MONTHS AND YEARS

	1929	1930	1931	1932	1933	1934	Total
January	1	2	1	2	2	4	12
February	2	2	1	2	2	3	12
March	0	1	6	1	1	5	14
April	1	5	3	5	6	1	21
May	1	2	4	4	2	2	15
June	3	1	1	0	2	2	9
July	0	0	0	0	0	0	0
August	1	1	0	0	1	1	4
September	0	0	0	0	0	0	0
October	1	0	1	0	1	..	3
November	0	2	1	1	1	..	5
December	1	1	1	3	2	..	8
Totals	11	17	19	18	20	18	103

By reference to *Table 1* it will be noted that the cases have varied very little in number from year to year, and that the incidence of the disease has been greatest in the winter and spring months. For some unexplained reason, males have outnumbered females almost two to one, and this difference was noted in the series which I[1] reported in 1929.

Table 2

COLOR AND SEX

Whites		Colored		Total	
Males	58	Males	9	Males	67
Females	31	Females	5	Females	36
Total whites	89	Total colored	14		103

The Children's Hospital has no beds for colored patients, but at the Hillman Hospital, with accommodations for both white and colored patients, there were 34 white and 14 colored patients.

The cases have, for the most part, followed some type of pneumonia, associated frequently with influenza, measles, or pertussis. Two resulted from foreign bodies in the bronchi; at least one from a lung abscess; two followed acute gangrenous appendicitis, one of these probably, and one certainly associated with subphrenic abscess; one resulted from septicemia originating in an infection on the lip.

Reports on cultures showed: pneumococci, 41; streptococci (various), 11; *Staphylococcus aureus*, 6; Pfeiffer bacillus, 1; colon and other organisms from the intestinal tract, 2; sterile cultures, 23; no reports, 19.

Table 3

PRIMARY ILLNESS

Acute respiratory infections	97
Foreign bodies in bronchi	2
Lung abscess	1
Acute appendicitis with subphrenic abscess	2
Septicemia from infection on lip	1
	103

BACTERIOLOGY

Pneumococci	41
Streptococci	11
Staphylococci	6
Pfeiffer bacillus	1
B. coli with *B. pyocyaneus* and *Staphylococcus aureus*	2
Sterile cultures	23
Unreported	19
	103

Some idea of the serious economic loss from empyema may be gained from a consideration of the fact that the average period of illness of these patients before admission to the hospital was 23 days, and that the average hospital confinement was 50 days. To this must be added an indeterminate period of impairment before complete restoration to health.

It is a distinct tribute to hospital efficiency in diagnosis to note that, in those cases where empyema developed in the hospital the average time from the beginning of illness to diagnosis of empyema was 18 days; whereas, in the cases which were admitted with a diagnosis of empyema, the patients had been ill 32 days.

Thirteen cases did not reach the surgical service; since, for the most part, they were moribund or in the terminal stage of some acute illness when admitted. All of these died except one, which recovered after aspiration. These cases will be excluded from further discussion, and we have for consideration a series of 90

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cases treated surgically, with eight deaths, a mortality rate of 8.8 per cent.

Table 4

Type of Operation	Number	Days Drained	Secondary Rib Resections	Deaths	Mortality Rate
Rib resection	62	32	..	5	8.05
Closed operations	27	35	6	3	11.1
Aspiration alone	1	....	....	0	0.
Total cases	90			8	8.8

MORTALITY IN CHILDREN UNDER THREE YEARS OF AGE

In the first year of life	Cases 5	Deaths 2	40
In the second year of life	Cases 10	Deaths 2	20
Under three years of age	Cases 29	Deaths 7	24.1
Under two years of age	Cases 15	Deaths 4	26.6
Under one year of age	Cases 5	Deaths 2	40

TYPE OF ANESTHETIC EMPLOYED

Local	76	General	14

Sixty-two cases were treated by open operation with rib resection, with five deaths, a mortality rate of 8.05. The average period of tube drainage was 32 days. Twenty-seven were treated by closed trocar-cannula types of operation, with three deaths, a mortality rate of 11.1. The average period of drainage was 35 days, and there were six secondary rib resections. One case recovered after aspiration.

A high death rate in young children has always been noted in empyema, and, of the eight deaths in this series, seven were in children under three years of age. The rates for these early years were as follows:

In the first year of life the mortality was 40 per cent (5 cases, 2 deaths)

In the second year the mortality was 20 per cent (10 cases, 2 deaths)

Under three years, 24.1 per cent (29 cases, 7 deaths)

Under two years, 26.6 per cent (15 cases, 4 deaths)

Under one year, 40 per cent (5 cases, 2 deaths)

Viewed from any angle, these death rates compare favorably with any other reports with which I am familiar, and are far lower than have been observed by many others.

Some of the factors to which I am inclined to attribute favorable results are:

(1) There were no "early open operations," and, in fact, no early operations of any sort if we except aspirations. It will be noted that the cases which developed outside the hospital had been ill 32 days, and that those developing in the hospital were ill 18 days before empyema was diagnosed; and that in all cases it was established by aspiration, that the "thick pus stage" had been reached before operation was undertaken.

(2) The use of local anesthesia, which was employed in 76 instances. With the preliminary administration of barbiturates and opiates, nervousness and apprehension are allayed, and, under infiltration with procaine hydrochloride, rib resection, intercostal incision, or trocar-cannula closed operations can be carried out without pain.

(3) The employment of open operation, with rib resection and tube drainage in more than two-thirds of the cases. From the mass of confusing suggestions and plans and claims for treating empyema, three papers have appeared within the past two years, from widely separated sections of the country, wherein the authors, after discussing empyema from every standpoint, conclude that the best method of treating acute empyema is an open operation with rib resection, carried out at the proper time. The authors of these papers are Graham and Berck,[2] of St. Louis; L. Wallace Frank,[3] of Louisville, and Carlson and Bowers,[4] of Minneapolis.

Graham[2] expresses his position very clearly when he says:

"After trial of various procedures, we have become convinced that the most satisfactory method of treating a case of acute empyema after it has really become an abscess is to drain it by an open drainage, and, in our experience, the most effective way to accomplish adequate drainage at this time, is by the resection of a portion of a rib at the most dependent part of the empyema cavity."

I am in full agreement with this opinion.

He further says:

"If care is taken to avoid the creation of an open pneumothorax during the formative period of an empyema, it makes practically no difference, so far as mortality is concerned, whether the case is treated continuously by some form of closed drainage or by the institution of an open drainage after a true empyema, that is, a true abscess, is present."

I can hardly subscribe to this, for, in addition to the evidence of the inadequacy of the drainage as shown by the frequent necessity for secondary rib resections, which inadequacy must add something to the sepsis from which the patient is suffering and which may be the turning point in the outcome of a given case, there is abundant evidence from many sources of the higher mortality attending the closed types of operation. For example, Rienhoff and Davison[5] report from the Johns Hopkins Hospital a 50 per cent higher mortality in children

under two years of age in closed operations than when open operation with rib resection is employed.

In the present series the closed operation showed a higher mortality, a longer period of convalescence, and, in certain instances, inadequate drainage, as evidenced by the necessity for six secondary rib resections.

Practically all patients were aspirated, some of them repeatedly, and a few had air replacement. Only two recovered, or showed any tendency toward permanent improvement, one in the medical service and one on the surgical side. In one instance the culture was sterile, and in the other a staphylococcus was found.

Some of the closed operations were combined with the tidal irrigation method of Hart.[6] I consider this of distinct help in closed operations, as the pus is diluted and the fibrinous flakes are dissolved and more easily evacuated. The apparatus is rather complicated, and is quite unnecessary in the treatment of empyema in children.

In this series of 90 cases, 31 were under my personal care, with one death, a mortality rate of 3.22 per cent. All were treated by rib resections and tube drainage except one, which recovered following aspiration. My further experience in the treatment of empyema in children consists in 25 of the 40 cases which I reported[1] from the Children's Hospital before the Southern Surgical Association in 1929.

The general plan of treatment which I have formulated is as follows:

(1) After physical examination stereoscopic x-ray plates are made in all suspected empyemas. In encysted empyema, with single or multiple pockets, this is essential for accurate localization.

(2) Aspiration is carried out to ascertain the nature of the fluid, and to be certain that no case is subjected to operation until the "thick pus stage" has been reached.

(3) Rib resection with tube drainage is carried out under local anesthesia unless there is some special reason for employing a general anesthetic.

(4) The tube should be of large calibre, not stiff, not too long, and placed at the most dependent part of the empyema cavity. It should be so fixed to the edge of the wound that it will not slip out of or into the cavity. I would here warn against the use of tubing that is old or rotten. I have known this sort of tubing to tear off at the point where it has been attached to the wound by suture or a pin, and to escape into the pleural cavity, with great annoyance to the surgeon and discomfort to the patient.

(5) Irrigation is not employed except for some special indication, and the wound is covered with a copious dressing of dry gauze. This should be changed as often as soiled. During the first 24 to 48 hours this will be frequently necessary; after which time, if drainage has been efficient, a change will rarely be needed more than once in 24 hours.

After operation the tube may remain undisturbed for from 7 to 10 days; after this it should be changed daily, and its length and diameter diminished to conform to the needs of the lessening size of the abscess cavity.

(6) When a tube has been placed in an empyema cavity, whether by open operation or by a closed procedure, it is incumbent upon the attendant to maintain continuous, unobstructed drainage until the cavity is obliterated. The progress of obliteration can be well observed by the frequent use of the x-ray. Our own practice is to make fluoroscopic examinations about once a week and to obtain stereoscopic plates every two weeks in cases which are slow in healing.

It not infrequently happens that a patient who has been convalescing with a temperature practically normal suddenly becomes acutely ill with rapid rise of fever. This is a signal for careful checking of the tube to see that it is not clogged with secretions. X-rays should be made to assure one that there are no additional pockets, no fresh pneumonic areas, no development of bilateral empyema, and no damming up of secretions below the level of the drainage opening. If no interference with drainage is discovered, complications must be looked for, and, in the case of children these will often be found in the intestinal tract or in the middle ear.

Likewise, if a rise of temperature occurs after removal of the drainage tube it is usually a sign that it has been removed too early and must be replaced unless some other definite cause for the rise can be discovered.

Furthermore, when a pleural abscess has been drained and the temperature does not show a definite tendency to subside, other areas of encysted empyema should be sought for, since recovery will be delayed until each pocket has been drained.

Two cases of this series have shown so many interesting features that they are deemed worthy of special report, and are here presented:

Case 1, Multiple Encysted Empyema Pockets.—F. M., a white male, aged 9, Hillman Hospital No. 81199, was admitted January 1, 1934, with diagnosis of empyema, which followed pneumonia beginning four weeks previously.

Stereoscopic x-rays showed a large shadow continuous with that of the heart and extending far to the right of the sternum. This was thought to be due to a pericardial effusion. Another shadow with two curved borders occupied the upper part of the right chest, but leaving a clear area toward the periphery of the lung. On examination of the stereoscopic plates, it was found that the shadow extended well out to the posterior aspect of the chest at the apex, and that it seemed to overlap the heart shadow in front and toward the median line. This we diagnosed as encysted empyema. On January 6 the chest was aspirated, the needle entering posteriorly in the second interspace between the angle of the rib and the border of the scapula. Pus was obtained, which showed a pneumococcus on culture. At the same time paracentesis pericardii was carried out, but no fluid was obtained.

On January 8, the second rib was resected at the apex of the axilla and tube drainage was instituted. This was followed by a moderate drop in temperature for a short time, when the fever again rose and the child continued very ill.

Further x-ray studies showed that the apex was clear and that the broad shadow over the cardiac area had cleared over the upper but not over the lower portion.

We became convinced that there must be another collection of pus somewhere in this dark area. On February 1, pus was located deep in the center of the shadow, and rib resection with tube drainage was instituted. The temperature still did not respond satisfactorily, and on February 8 the wound was enlarged and another pocket was located still deeper and lower down. Following this operation improvement was rapid.

Fig. 3 shows the chest with three tubes *in situ*.

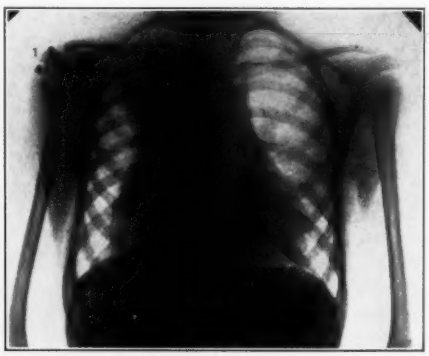

Fig. 1, Case 1
On admission. Broad shadow in region of heart. Shadow of empyema at right apex.

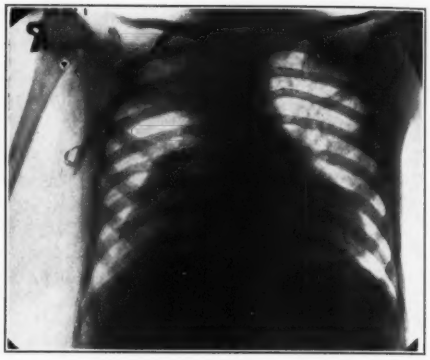

Fig. 2, Case 1
Tube in apical empyema pocket. Upper part of mediastinal shadow clearing.

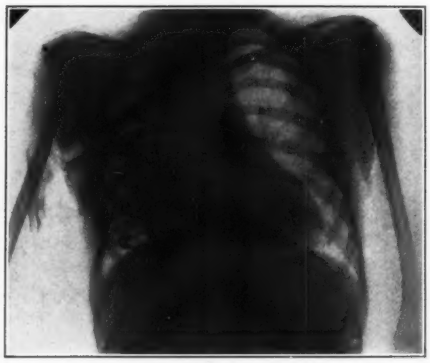

Fig. 3, Case 1
Tubes in three empyema pockets.

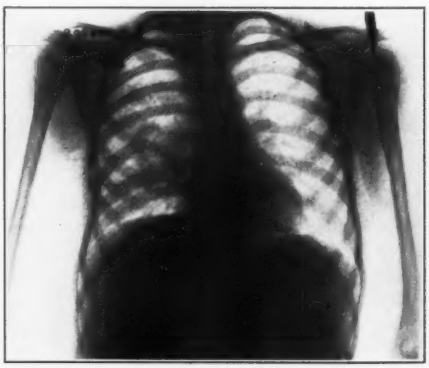

Fig. 4, Case 1
Final result. All tubes have been removed and all cavities have been obliterated.

On March 23, after having been drained 72 days, the cavities were completely obliterated and the patient was discharged cured, and has remained well.

Case 2, Acute Appendicitis, Spreading Peritonitis, Subphrenic Abscess, Empyema.—B. L. C., a colored female, aged 12, Hillman Hospital No. 84136, was admitted on August 12, 1933, with a diagnosis of acute appendicitis of six days' standing. Immediate operation revealed a gangrenous appendicitis with spreading peritonitis.

Eight days later a diagnosis of empyema of the right pleura was made. Aspiration revealed pus containing colon bacilli and other organisms usually found in suppuration from the intestinal tract. It was assumed that this empyema was associated with subphrenic abscess, but x-ray study did not reveal any evidence of perforation or rupture of the diaphragm, and, at operation, no connection could be demonstrated between the pleural cavity and the subphrenic area. On August 24, rib resection with tube drainage was carried out. The patient made a complete recovery from the appendical operation, and after drainage of the pleural cavity for 97 days was discharged as cured on December 7, 1933.

She was readmitted on January 27, 1934, and discharged March 5, 1934; was again in the hospital from April 25 to May 3; and again from June 13 to July 28, each time with reaccumulation of pus in the pleural cavity, and each time having the old wound reopened and a tube replaced.

Fig. 5 shows the appearance of the chest when the empyema was first diagnosed.

Fig. 6 shows the appearance of the chest on one of the readmissions, with the cavity injected with lipiodol.

On September 19, 1934, she was again admitted, and came into my hands. At this time the temperature was 105°, and x-ray revealed a shadow occupying the region of the cavity seen in *Fig. 2*. A long spur was noted, also, growing from the end of the resected rib (*Fig. 7*).

On September 20, I resected the rib above the one formerly resected and entered a circumscribed cavity which extended to the lower border of the second rib.

In resecting the spur from the originally resected rib, it became necessary to resect the rib below this, and in so doing an abscess cavity entirely separate from the one already opened was found extending downward and forward almost to the costal cartilages. It was diffi-

Fig 6, Case 2
Empyema cavity injected with lipiodol.

Fig. 5, Case 2
Appearance of chest when diagnosis of empyema was made.

Fig. 7, Case 2
Appearance of chest on admission September 19, 1934. Note shadow in outer aspect of right pleural cavity.

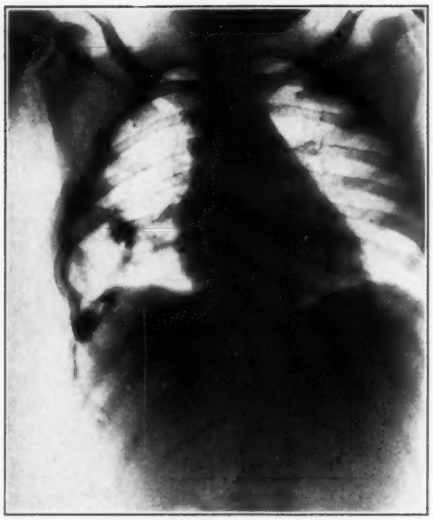

Fig. 8, Case 2

Small shadows of lipiodol in pleural abscess and in subphrenic abscess three weeks after operation. These abscesses have now completely healed.

cult to identify the bridge of tissue which separated these two abscesses, but it was cut away so as to convert the two cavities into one. Microscopic sections showed it to contain muscle fibres, thereby identifying it as the diaphragm.

The cavities were packed with vaseline gauze and the patient has completely recovered.

Fig. 8 shows all that remains of the upper and lower pockets of the two cavities three weeks after operation.

Rapid closure of an empyema cavity may sometimes be obtained, but is not to be expected. The average duration of tube drainage in this series was 33 days.

Children may, with advantage, be allowed to get out of bed as soon as they feel equal to it, provided there are no circulatory or other complications.

If one is assured that patients will return regularly to the office or out-patient department for dressing, they may be allowed to leave the hospital much earlier than has been permitted in this series. No patient, however, should be allowed to leave the supervision of the surgeon until the tube has been out of the pleural cavity for several days with no recurrence of symptoms, and until x-ray examinations show that the cavity has been obliterated.

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Discussion follows paper of Dr. Donald, page 229.

EMPYEMA: RIB RESECTION WITH OPEN DRAINAGE VERSUS THE NON-OPEN METHOD*

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For the past one and a half decades the current literature on empyema has placed much emphasis on the mode of treatment, on the question: should the empyema case be treated by the open or non-open method. As a result, various mechanical devices have been advocated, new modifications of old methods, new details in technic; all of which have created in the minds of practitioners and surgeons a great deal of confusion in the treatment of empyema, with a tendency to disregard the varying pathology of the disease and the fundamental principles in its treatment, in favor of relatively unimportant methods and details.

Empyema is not (or is only rarely) a disease entity. It is a complication of an antecedent respiratory infection, or one of several serious pathologic conditions, associated with a respiratory infection.

The pleura, like other serous membranes, is made up of fibrous, elastic tissue covered with endothelial cells. Its lymphatics are numerous over the lungs and the intercostal spaces.

The causative organism is the pneumococcus, hemolytic streptococcus, staphylococcus, or less often, the influenza bacillus. Should the case be one of acute respiratory infection with empyema, or should the chest pathology be secondary to an acute gallbladder, appendix or perforated duodenal ulcer, colon bacillis will often appear

*Read in Section on Surgery, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

*This report is based upon a series of 27 private cases treated by rib resection with open drainage, including three cases which had attempted closed drainage, and an analysis of empyema cases at the Hillman Hospital for the past five years.

in great numbers in the pleural exudate, seldom alone, but associated with either the pneumococcus, a hemolytic streptococcus, or both.

Entamoeba histolytica, like the colon bacillus, is sometimes found in the empyema exudate, gaining entrance chiefly by direct extension from a rupture of an amebic abscess of the liver through the diaphragm. It, also, is usually associated with acute pyogenic organisms such as a hemolytic streptococcus, or a staphylococcus. Recently I saw such a pathological process with massive right empyema, and not until the ameba was found in the aspirated fluid was the primary infection thought to be associated with the liver or the alimentary tract.

The patient on entering the hospital was free of the usual colon and bowel symptoms found in amebic infection, such as frequent bowel movements with tenesmus, and neither blood nor mucus was detected in the stools. His symptoms suggested an acute right chest disease. Toxemia was severe and the patient's history of illness of little value. He succumbed on the third or fourth day following admission to the hospital. At autopsy the right pleural sac contained several hundred cubic centimeters of serosanguinous fluid, with an opening from the base of the pleural sac through the diaphragm to an abscess in the right lobe of the liver, with many healed and unhealed ulcers in the colon and small bowel. Such a condition is relatively rare and the mortality is high unless the primary focus of infection is recognized and the specific treatment promptly begun with drainage of the empyema.

The Relationship of the Different Pyogenic Infections to Empyema.—From the bacteriological standpoint there are four types of empyema:

(1) One complicating lobar pneumonia, usually due to the pneumococcus

(2) Those due to virulent streptococcic infections.

(3) Those due to less virulent streptococcic infections

(4) Following influenza due to various organisms

(1) The pneumococcus causes from 50 to 60 per cent of the cases of empyema, with a higher percentage in children. In an individual who has recovered from pneumonia empyema occurs as a simple intrapleural abscess, varying in size and location; the outer wall of which is formed by the bony thorax, the inner wall by the partly compressed lung, the mediastinum or the diaphragm. The pleural sac shows varying grades of inflammation and thickening, depending upon the type and duration of the infection. The pus is usually thick, containing large amounts of fibrin which undoubtedly contribute to the stabilization of the mediastinum. There is some cough, and moderate pain and dyspnea if the accumulation is large. There is an outspoken leukocytosis of the polymorphonuclear variety, more marked than during the course of the pneumonia and averaging between 20,000 and 30,000 per cu. mm.

(2) The virulent hemolytic streptococcic infection is a marked contrast with the simple pneumococcus type. The empyema here appears not after the subsidence of the pneumonia, but coincidentally with it, often as early as the fourth or fifth day at the height of the pneumonia. The pleural cavity fills quickly. The rapidity with which it fills in the hemolytic streptococcic infection often reaches two or three liters at the first aspiration. Measurements of fluid withdrawn at daily intervals show that the fluid accumulation frequently reaches a liter per day. At first it is straw-colored, tawny, or pinkish from admixture with blood pigment; later it becomes cloudy due to the enormous number of micro-organisms. The empyema is not the sole pathologic condition, but is associated with one or several inflammatory processes, including pulmonary abscess, mediastinitis, pericarditis, meningitis, peritonitis and septicemia. MacCallum's[1] explanation of the rapid fluid accumulation in hemolytic streptococcic infection is as follows:

"The lymphatics run from the pleural network, by way of the interlobular septa, bronchial wall and the blood vessel walls to the nodes at the hilum of the lung, quickly becoming a transport of the bacteria. A great number of the hemolytic streptococci are found in the canal and the sinus of the lymph nodes at the hilum where they appear to be halted, causing a thrombosis of the lymph channels which become markedly distended to a size appearing to the unaided eye as beaded white strands on the cut surface of the lung and often becoming confused with the obstructed channels in both directions. They pass from the lung to the pleura (in a direction opposed to that of the current in the unobstructed lymphatics), infect the walls of the pleural cavity and set up intense inflammation with outpouring of the fluid exudate. The pleura itself and all the interlobular septa become edematous and permeated by a serofibrinous fluid, wandering cells and micro-organisms from the pleura. The effusion of the fluid exudate becomes a dominant feature of the whole process, both in clinical and anatomical changes."

(3) The less virulent hemolytic streptococcic infection produces the more simple empyema, as it occurs following pneumonia.

(4) The influenza empyema may be of a

virulent type or may take the form of the simple post-pneumonia type.

The degree of the infection of empyema is in proportion to the virulence of the bacteria or the organism causing the disease.

Pleurobronchial Fistula.—This frequently follows lobular or bronchopneumonia, and is almost invariably associated with hemolytic streptococcic infection without the peribronchial lesions. The streptococci invade the alveoli, which become filled with blood, leukocytes and an enormous number of bacteria, giving rise to patches of consolidation, followed frequently by mucus and peripleural hemorrhage, and multiple abscesses lying mostly near the periphery of the lung and extending to the pleural surface. A rupture of such an abscess into the pleural cavity, or an extension of the necrosis to involve the structure of the pleura, would inevitably lead to empyema and the coincident communication of the abscess with a patent bronchus, with a resulting pleurobronchial fistula.

The Treatment of Empyema.—As Graham and Berck[2] have ably expressed it, there are two essential aims in rendering treatment for the cure of empyema, namely:

(1) To save the life of the patient.

(2) To shorten the period of convalescence as much as the pathological process will permit.

In rendering treatment to the empyema patient, it is essential to determine by a diagnostic aspiration the type of infection, relieving in part the intrapleural pressure and permitting the pneumonia process to clear and a stabilization of the chest contents to occur before treatment either by rib resection with open drainage or some form of closed treatment. It is on this basis that the ultimate results are determined, whether a high or a low mortality.

Murphy,[3] in 1898, warned against too early surgical interference in the removal of pus from the pleural cavity, or any form of surgery for opening the cavity, until sufficient time for the stabilization of the chest contents. If the chest is opened before this stage of the disease is reached the air, in passing in and out, causes the lung on the opened side to contract to the hilum. The mediastinal septa and contents flap to and fro in respiration, like a sail during a lull. When the air is inhaled the mediastinal septum is concave to the uninjured side; when air is exhaled it is convex. The chest ceases to be a cylinder for the piston, the diaphragm, in the respiratory act. The mediastinal septum becomes a second diaphragm which contracts and destroys the aspirating or the piston power of the true diaphragm. With this motion of the septum there is comparatively no exchange of air in the lungs, merely a variation in the shape of the lungs.

Well do we remember the influenza epidemic in the fall of 1917, lasting through to the spring of 1918, and the increased virulence of the epidemic which was renewed in the late summer and continued through into the late winter. The epidemic sweeping through the country from coast to coast was not confined to the army camps alone, but attacked the civic population as well.

The hemolytic streptococcus was the predominating organism. The virulence of the epidemic was so great at Camp Sherman (Beck[4]) that of 7,618 cases admitted for influenza more than a third developed pneumonia. The mortality from pneumonia from this camp was 42.07 per cent. Out of 1,159 patients who recovered from pneumonia 150 cases developed empyema, the empyema percentage to that of pneumonia being 12.8 per cent. Under normal military and civil life 2 to 4 per cent of pneumonia patients develop empyema. Measles and influenza were the chief antecedent diseases for the development of the pneumonia. The virulence of the infection and the subjection of the empyema patient to surgery, rib resection with open drainage, if the chest fluid contained organisms, irrespective of whether the fluid was serosanguinous, seropurulent, or purulent, and before the mediastinum became stabilized resulted in a mortality of 47.6 per cent. During the same year, 1918, the Empyema Commission[5] reported a series of 23 cases and one death, mortality 4.3 per cent. The drop in the mortality from the high figure to the low was chiefly through attention to the preoperative stage, by stabilizing the chest contents by repeated aspirations of the pleural cavity until frank pus appeared. In empyema caused by the hemolytic streptococcus, from two to three weeks elapse before the exudate becomes purulent. Attempted drainage, either by rib resection with open drainage, or by punch operation and catheter drainage before this stage is reached, will often find the pneumonia process active, the patient's resistance weakened by the toxemia of the disease, and there will be danger of the collapse of the lung with a pneumothorax. Often the patient's respiration reaches 40 or more per minute; he is frequently cyanosed with dyspnea, and the pneumonia is bilateral with the effusion on the side of the better of the two

lungs, and the possibility of blood stream infection since the organism may gain entrance through the operative wound.

Empyema associated with septicemia is a grave condition. The serous cavities of the pericardium, peritoneum and mediastinal space are equally affected with the pleural sac. An operative measure to relieve the effusion should not be considered the principle point of the treatment, and various efforts should not be attempted for its drainage, either by aspiration or any form of closed drainage until the patient has recovered from the toxemia of the disease. The patient should be treated expectantly by supportive measures, such as repeated blood transfusions, intravenous glucose or saline solution, either by continuous intravenous or repeated intravenous injections, free amounts of fluid by mouth or rectum, and high carbohydrate diet, morphine sulphate to establish rest and care of such complications as otitis media, or arthritis, through local measures until the patient has recovered from the toxemia and the infection has found lodgment in the pleural cavity. Then aspiration and, later, drainage are indicated.

Treatment of Empyema by the Closed Method.—As early as 1844, Roe[5] reported a series of cases treated by aspiration, and from then until the World War enthusiasm rose and fell in favor of rib resection with open drainage.

Patients in advanced life and children under two years of age, of normally low vital capacity, or capacity lowered by pneumonia or other serious illness, or by operation, may find the added load imposed by the open pneumothorax affecting both lungs, more than their reserve capacity can compensate for. In this type of acute empyema, closed drainage with irrigation is a valuable method of treatment.

Dakin's solution has an advantage over saline solution as an irrigating fluid, since it softens the fibrin and the necrotic material, and the fluid prevents pocketing of the pleural surfaces. Irrigating at a low pressure will not distend the pleural sac to interfere with the cohesion of the two pleural layers, but will hasten the expansion of the lung. Irrigation is to be continued until the cavity is obliterated or until there is no further decrease in the size of the cavity. This is not done to avoid rib resection, but to safeguard the life of the critically ill patients.

Hart's[7] ingenious method included tidal irrigation brought about by the respiratory fluctuating intrapleural pressure, with a report of a series of 57 cases with six deaths, a mortality of 10.5 per cent.

Deidrich,[8] in 1918, stationed at Camp Pike, recommended the punch operation with catheter drainage, reporting a series of 34 cases, with no mortality; whereas, during the months of October and November of the same year, with the same type of treatment from a series of 61 cases the mortality was 11.47 per cent. The first series consisted of cases treated during the quiet period of the epidemic, and the later series represented those who became ill during the height of the epidemic.

In McEachern's[9] series of 75 cases of empyema treated by the closed method, all children up to 11 years of age, there were two deaths, with a mortality of 2.6 per cent. Both deaths were children under two years of age. There were 21 cases in this age limit, making a mortality of 9.5 per cent.

Disadvantages or failure of the closed method come from the failure of the mechanics of the treatment; for example, from slipping or misplacement of the catheter, or plugging of the catheter with mucus or fibrin which prevents proper and constant drainage and causes a thickening of the walls of the pleura. The delay coming from the defective drainage and the fixation and thickening of pleura will add to the chronicity of the disease and interfere with future surgery. The average surgeon cannot command trained assistants at all times as recommended by some of the advocates of the closed drainage. The simple closed method of syringe aspiration with syringe irrigation will give as good results as this more complicated method, or even better.

A survey of empyema cases at the Hillman Hospital for the past five years shows:

There were 79 cases with 8 surgical deaths, a mortality of 10.2 per cent, the ages ranging from 11 months to 65 years.

Of these cases 42 were children up to 12 years of age, among whom there were four deaths, a mortality of 9.5 per cent. Seventy-three of these cases were treated by thoractomy with rib resection, with six deaths, a mortality of 8.2 per cent.

In the remaining six cases, in which repeated aspiration and the punch operation with intercostal catheter drainage were employed, there were two deaths, a mortality of 33.3 per cent.

In my series of 27 private cases with ages

ranging from 10 months to 65 years, treated by thoractomy with rib resection after the mediastinum had been stabilized by repeated aspiration, there was one death, a mortality of 3.7 per cent. In this series there were two cases of bronchial fistula.

Of this number 16 were children up to 12 years of age.

In 18 cases of this series the pneumococcus was the prevailing organism, a percentage of 66.6. The average time for the wound to heal was 50 days. Three patients of this series (27 private cases) had been subjected to closed drainage before coming to us.

Of this number one case required secondary drainage three months following rib resection. This was a student of one of the local colleges who had bronchopneumonia (hemolytic streptococcus). He left for his home in a distant part of the state and the tube was removed too early. At the second operation a pocket of 50 c. c. capacity was discovered within the thorax. With Dakin's irrigation the wound healed promptly.

Rib resection with open drainage will offer better drainage with a low mortality and early convalescence in the greater number of empyema cases. Delay all operative interference until the chest contents are stabilized, employing some form of closed drainage to relieve the intrapleural pressure. The operative measures are relatively easy. One per cent procaine hydrochloride solution with three drops of epinephrine to the ounce, is used, selecting a point at the most dependent part of the chest, at the eighth or ninth rib in the postaxillary line. The anesthetic is more lasting and a minimum amount is required by the block method. A point about 1½ inches on the proximal side of the proposed incision is chosen, the needle is passed into the intercostal space in close proximity to the under surface of the rib, and several c. c. of the procaine hydrochloride are deposited. This will block the main intercostal nerve, with moderate infiltration of the solution in the skin, muscle and pleura. Flush the rib with gigli saw level with the periosteum, sealing the end of the rib with wax to lessen the frequency of osteomyelitis from hemolytic streptococcic infection. Place a drainage tube with good calibre and well fenestrated into a cavity of sufficient size to secure proper drainage, with small tube or No. 18 French catheter. For children use a tube in proportion to the size. Close the wound by the layer method snugly about the tubes, clamping the tubes for 12 to 24 hours, pressure to be released as the condition of the patient will permit, transfixing the tube with a safety pin and fastening to the chest with adhesive plaster. Institute pulmonary gymnastics after the acute symptoms have subsided. After the first week the tube should be partly withdrawn and removed for cleansing at frequent intervals. Should the drainage be copious, irrigate the cavity with Dakin's solution with minimum pressure. Fluoroscopic and roentgen views should be frequently made to aid in determining the expansion of the lung, size of the cavity, and condition of the pleura.

CONCLUSIONS

(1) Various forms of closed drainage for the treatment of empyema have been recommended, with many popularized mechanical devices, and as a result of this enthusiasm the virulence of the infection and the pathologic condition which are the principal factors in the disease have in part been put aside for irrelevant, unimportant methods and details in the treatment.

It is interesting to speculate (Bonynge[10]) whether the *Streptococcus epidemicus,* which public health bacteriologists believe to be the cause of septic sore throat and mastitis in milch cows may be connected with outbreaks of virulent streptococcus septicemia which during the war in army camps were first diagnosed as empyemas.

(2) The simple pneumococcus and the less virulent streptococcus infections behave quite differently from the epidemic types. The empyema mortality will vary with the virulence of the infection, irrespective of the type of treatment, providing the surgeon does not too early in the course of the disease, through injudicious methods, create an open pneumothorax.

(3) Pneumococcus empyema appears within two weeks after the crisis of lobar pneumonia. It is characterized by heavy deposits of fibrin. Hemolytic streptococcic effusion comes during the active course of the disease. Repeated aspiration or some form of closed drainage should be used, depending on the type of patient, until the empyema exudate is frankly pus or purulent.

(4) Closed drainage is of distinct advantage in bridging the infant under two years of age, very old patients and very sick patients, through the acutely toxemic stage. The individual judgment of the surgeon should be the deciding factor for time of rib resection and open drainage, but the closed method by intercostal drain-

age requires constant supervision by trained assistants.

(5) Block anesthesia, using 1 per cent procaine hydrochloride with epinephrine is better suited for empyema cases than general anesthesia.

(6) For copious drainage in empyema, Dakin's solution offers better results as an irrigating fluid. It tends to dissolve the fibrin and necrotic material, thereby favoring expansion of the lung if used at low pressure, and will assist the closure of the wound in less time than will normal saline solution.

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DISCUSSION (*Abstract*)

Papers of Dr. Mason and Dr. Donald

Dr. Alton Ochsner, New Orleans, La.—The indications in the treatment of empyema are drainage of the pleural fluid and reexpansion of the lung. Ideally the method which accomplishes both of these is the method of choice. The advantages of the closed method of drainage are quite obvious in that because of the normal negative pressure which is reestablished in the pleural cavity a reexpansion of the lung is favored. A definite objection to the closed method of drainage in the past has been that in order to have the drainage air-tight it has been necessary to use small tubes, which are easily clogged so that adequate drainage is not secured. The disadvantage of the open drainage has been that an open pneumothorax has resulted, which possibly has interfered with reexpansion of the lung. A distinct advantage, however, is that the drainage has been adequate and fool-proof.

Relatively recently in the Department of Surgery at Tulane University we have been using a method which we feel combines the advantages and obviates the disadvantages of both methods. It is a method of closed drainage advocated by Bethune of Montreal. It consists of the production of a large thoracotomy wound and the introduction into the empyema cavity of a large drainage tube, which may be as large as 2 cm. in diameter or even larger. This tube is passed through a sterile rubber bath sponge and the sponge tightly compressed against the chest wall by adhesive plaster. In this way the entire wound in all its ramifications is completely filled with the sponge, making it air-tight. The tube is connected with a tube extending to a vessel, containing water, on the floor, so that an air-tight drainage is secured, but a drainage with a tube so large that it cannot become clogged. In our hands this has been very gratifying, and we believe shortens the convalescence of our patients. I am presenting it here merely because I feel that it is a simple procedure and yet one which overcomes the usual disadvantages of closed drainage, but retains the advantages of that method of treatment.

Dr. James W. Nixon, San Antonio, Tex.—Drs. Mason and Donald have brought before us a subject which is of special interest just now because of the fact that we are reaching the season of the year when empyema of the thoracic cavity is most apt to be encountered.

The treatment of empyema is largely a question of drainage. The drainage, however, must be instituted at the right time, at the right place, and by the right method, and maintained until the empyema cavity is completely obliterated. And before the drainage in these cases can be properly instituted one must understand fairly well the intrathoracic physiology. With the proper understanding of this important side of these cases, it does not become a question of closed drainage versus open drainage, but of which method of drainage is best suited for each particular case. Indeed, it may become necessary at times to use both the closed and the open method in the treatment of any individual case.

It must be borne in mind that under normal conditions the lungs are held in expansion by the negative pressure of the intrapleural space. It must be remembered also that the mediastinum is so mobile that the two pleural cavities function as one from the standpoint of intrapleural pressure. Changes in the intrapleural pressure on either side will therefore affect intrapleural pressure of the opposite side. Thus it can be seen that the intrapleural pressure of both pleural cavities would be disturbed should an open pneumothorax on either side be created by a rib resection in an early acute empyema before the establishment of interpleural adhesions and the stabilization of the mediastinum have taken place. This factor has accounted for the substitution of the closed method of drainage in such cases. This, according to the late Carl Hedblom, is the most important contribution to the treatment of acute empyema since Hippocrates.

If a case is seen late and the abscess cavity is well walled off by adhesions, a rib resection is unquestionably the procedure of choice. On the other hand, the early case which demands relief from pressure should, I think, be treated first by the closed method and subsequently by a rib resection if necessary. Should closed drainage become necessary in an early empyema for relief of pressure symptoms, it is unwise to withdraw all the fluid rapidly. This will bring about a sudden mediastinal shift with the resulting sequelae and in addition it will permit contact of the two inflamed pleura at various points that may become adherent and produce multiple abscess pockets which add materially to the gravity of the case.

To my mind, at least, there seems to be no indication for anything other than local anesthesia for these cases. If by using local anesthesia we are able to perform a complete extrapleural thoracoplasty, why should we not be able to use it in resecting a small section of the rib or inserting a tube in the intercostal space.

Finally, the patient should be given the best of supportive care in addition to an abundance of fluids. Particular attention should be given to a high caloric diet, rich in proteins, which these patients seem to require more than almost any other type of postoperative case. I am becoming increasingly more enthusiastic over blood transfusions. As soon as the cardiac condition permits we make use of them.

An understanding of the mechanism of respiration and the mechanics of drainage and the importance of supportive measures for the patient will be necessary for one to obtain the best results in the management of empyemas. Without this understanding the invasion of the thoracic cavity by the surgeon is not safe. I am sure the excellent results quoted by Drs. Donald and Mason are due to their intimate knowledge of these factors.

Dr. A. O. Singleton, Galveston, Tex.—I agree with Dr. Mason that the most essential things in the success of the treatment are, first, selection of the proper time for drainage, and second, adequate and continuous drainage until the cavity is obliterated. For the past fifteen years we have discontinued the open drainage with resection of ribs in thoracic empyema, and have had over 100 consecutive cases of empyema treated by a modified closed method, using a trocar and cannula between the ribs with a marked degree of success. A few years ago I reported eighty consecutive cases treated in this way with a mortality of 5 per cent. This method has the advantage of being simple, requires less surgery, gradually drains off the fluid with a more prompt expansion of the lungs, and we prefer it in practically all cases.

Dr. Frank K. Boland, Atlanta, Ga.—I gather from the discussion that we are all getting more in accord in regard to the treatment of acute empyema.

Dr. Evarts Graham has taught us a great deal about empyema, and one of the things is that the results of treatment depend as much upon the virulence of the disease as upon the method of treatment employed. The virulence of the infection in the cases in our army camps during the World War was such as we had never seen before nor will ever see since. The mortality ranged in different cantonments from 30 to 60 per cent. The method of treatment adopted in the beginning of this epidemic was the open method of rib resection, which, of course, was wrong, because the cases were only one or two days old and stabilization of the mediastinum had not had time to take place. At some base hospitals this method of treatment was continued throughout, while at others more conservative methods were adopted, such as repeated aspiration, or no aspiration at all. No matter what method was used, the mortality rate dropped late in the epidemic, because the wave of extreme virulence had passed.

If we are in the midst of an epidemic of virulent pneumonia and empyema and get a high mortality rate in the surgical treatment, we condemn the method that we are using and resolve to try something else. Whereas, if we are in the midst of a mild epidemic and the results are good, we think it is all due to the method we are using and we resolve to continue to use it.

In the hands of the average operator I believe that the open treatment by rib resection will give the most satisfactory results in the majority of cases, of course granting that the operation is done at the right time and not too soon. The closed method of treatment theoretically may be all right, but it has always struck me as being too complicated and as intended for use mainly in well equipped hospitals, in the care of an especially trained staff. I have always been satisfied with the results which I have obtained by the open method, with rib resection.

Dr. Donald (closing).—There are two essential points in the treatment of the empyema case.

(1) The mediastinum should be stabilized by repeated aspiration of the pleural cavity and by waiting long enough for the pneumonia process to clear before instituting surgical measures.

(2) In children under two years of age, very old patients and critically ill patients, who have normally a low reserve, the added load from attempted surgical drainage may rob them of their only chance. It is in this type of case that some form of closed drainage is a better procedure than rib resection and open drainage. This will build up the reserve and should the empyema continue, rib resection can be done safely at a later date.

The mortality percentage in empyema, as Dr. Boland mentioned and as was brought out by the essayist, is in proportion to the virulence of the infection and the degree of the epidemic. The mortality will vary in different localities and at different seasons of the year.

Dr. Mason (closing).—I had anticipated more protests of my advocacy of rib resection and tube drainage from those who prefer closed methods of operating, and take it as an indication that the advantages of open operation, carried out at the proper stage of the illness, are being more generally accepted.

Dr. Singleton has excellent results with the closed operation and I advise those who prefer this method of procedure to familiarize themselves with his instrument and with his technic.

The Bethune technic, which is employed in Dr. Ochsner's clinic, was described by Carlson and Bowers in the September issue of *International Surgical Digest*. It is interesting, but I have had no opportunity of trying it.

In furthering my claims for the advantages of open operation I take issue with those who advise against this method of treating empyema in young children. Rienhoff and Davison, in 1928, reported that closed operations at Johns Hopkins Hospital in children under two years of age carried a 50 per cent higher mortality than the open.

In the present series I have treated five cases by rib resection and tube drainage, five children whose ages ranged from 3 to 22 months, with full recovery in each instance. Eight infants whose ages ranged from two to twenty-four months were treated by closed operations, with three deaths.

OBSTETRICS AS A COMMUNITY PROBLEM*

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Successful childbearing can no longer be regarded as a problem for the individual; there is, at present, an interest in the subject not bounded by such narrow limits. The community, the state, and the nation are all concerned with the birth and rearing of healthy, normal children, and with the preservation of the mother as the fountain head of the family. Personal health is very closely linked with personal success and happiness; so the prosperity and spiritual welfare of a community are in a large measure dependent on public health. In other words, the maintenance and conservation of health has come to be the responsibility equally of the community and of the individual.

The recognition of the community's responsibility in this has given rise to the statement that "public health is purchasable." It is indeed purchasable in the sense that laws, by which the spread of infectious and contagious disease is controlled, can be made and enforced by united influence and funds of the community. This does not, however, adequately state the problem. Legislative health measures must be carried out cooperatively by the medical practitioner and the official health agencies, and it is as difficult as it is important to define the exact measure of these agencies' responsibility on the one hand, and of the physician's responsibility, on the other. These difficulties of definition have placed stumbling blocks in the way of needed reform and treatment; they are, in the main, problems of administration. Cooperation, however, between the medical profession and the public authorities has already solved many of them and will continue to do so.

Governmental participation, the need for which is generally acknowledged in certain other accepted fields of medical practice, has not as yet been sufficiently active in the field of childbearing and maternal welfare. It is true that we have compulsory birth registration over the greater part of this country, that midwife regulation is attempted, that puerperal fever is reportable. But what have we done as communities to make pregnancy and labor itself a fairly safe procedure for the prospective mother? Efforts to do so must be recorded, but these have met with doubtful success, if success must be measured by the puerperal mortality records of the last thirty years. I will not burden this address with a detailed recital of statistics; these are readily obtainable and have been developed by competent observers. It is, however, necessary to say that all such observers have found the death rate from puerperal causes to be approximately 6 per cent. The birth rate in the United States registration area in 1920 was 23.7 per 1,000 population, the general death rate is 13, while the total maternal mortality was 8 per 1,000 live births. This was the highest death rate recorded in recent years; since then the figure varied from 6.5 to 7 deaths per 1,000 live births. About one-third of these deaths were due to septicemia. During the period from 1920 to 1931 the birth rate declined to 18 and the general death rate to 11 per 1,000 population. But it is important to observe that with a decidedly less number of births the fatality rate among pregnant women remained practically unchanged; it has continued to average annually 6.6 per 1,000 live births. An accumulating number of surveys made during the last 10 years shows that although the situation may be slightly better in some places, it is worse in others. These studies demand our attention because, with the facts at hand, we must admit the magnitude of our problem, and acknowledge the need for devising means to combat the ravages of death among women at the time when life is most important to them.

The mere compilation of fatalities from death certificates seems inadequate and not sufficiently informative; the careful study of individual cases, therefore, has been made the basis of more recent surveys. Among the most noteworthy are those of the Federal Children's Bureau in 15 scattered states during 1927 and 1928, the New York Academy of Medicine Report on the puerperal deaths in that city in the three years from 1930-1932, and the Philadelphia County Medical Society's report of the deaths in 1931, 1932 and 1933. Further studies by Plass, Holmes, Adair and Mussey, and DeLee, present very similar results. From these three principal conclusions may be drawn: that there is a high, apparently unjustified, puerperal death rate; that there are remedies at hand for reducing it, that a certain number of these deaths are definitely preventable. In fact, the belief is steadily gaining ground that perhaps one-half of these

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deaths may be so designated. It is quite natural that the publicity which has attended the issuance of these various reports has awakened people to ask "What should be done to make childbearing safer?" Let us, with this question in mind, reiterate the fact that six mothers die in the United States for every thousand live babies born. To save three of these is a task we might set ourselves. I cannot think of anything more important, more self-evidently important, than to preserve these lives. From what we have found out about the causes of these deaths, and from carefully worked-out procedure which have accomplished in groups of selected cases a marked reduction in the death rate, it is fair to assume that they can be preserved. We may well inquire, then, why methods to accomplish this end are not made available to most of the mothers in this country. It would not be possible, here, to trace the development of our ideas of maternity care, nor to examine thoroughly the difficulties which oppose at every turn, the bringing of expert care to every mother. But it is possible to indicate the manner in which some of the characteristic thoughts of the public, as a whole, as well as those of educators, doctors and nurses, must be changed before we can go very far toward improving general conditions. If we can change the thinking there are greater hopes of changing the action resulting from that thinking.

First, let me say that as a nation we are not fully aware of the problem. This lack of proper knowledge is so widespread that it appears as the causative force behind many of the other impediments to progress in maternity care. Let me refer again to the statement that three of the six women who die in every thousand live births die needlessly. Now, these three deaths do not assume the importance and significance which they really have, neither in the average physician's practice, nor in the average hospital, nor in the average community. He would be a busy physician, indeed, who officiated at 33 births a month, or 400 a year. If he did two and one-half years would elapse before he had delivered 1,000 babies, and before the three preventable deaths would be made apparent. And this record would be of little value, as an index, because averages are dangerous when limited to so few cases as a thousand. This is true, also, for the hospital and the community; if the number of births is small the figures mean little, because they are drawn from a small number of cases. The actual deaths occur so seldom, the time element spaces them so far apart, that they do not become a cause of public or individual concern. No effort is made to ascertain either public or personal responsibility; the need for it is not apparent to the casual observer. Only when we become aware of conditions by the inspection of statistics dealing with large groups of the population and an annual mortality of 16,000, are we on sure ground, and then we are so far away in our thinking from individuals and technics that it is difficult to bring the responsibility home to any one person.

Yet, this is precisely what must be done if motives are to be supplied to those who are able and ready to change conditions. It is obvious that those of us who are satisfied with the present situation are not going to do anything to change it until we become dissatisfied. And if changing conditions mean changing conduct, there must be a clearly shown and generally recognized responsibility among those upon whom it really rests.

Who are the responsibile persons? I believe that an obligation exists among several groups, each in a different way, to do certain specific things in order to bring about improvement. The groups are:

(1) The husband and wife
(2) The physician
(3) The nurse and midwife
(4) The medical educator
(5) The public as represented in the community

(1) *The Husband and Wife.*—In this age of scientific discovery and rapid medical advancement, all of us are imbued, more or less, with a belief that the day of miracles is truly at hand. It is easy to understand why husbands and wives seek a physician who can provide a simple, easy, painless childbirth. Often a nervous, emotional woman will demand that her physician promise to give her an anesthetic so that she will be relieved of all pain, and these appeals are sometimes difficult to resist. Prospective parents, however, should be informed that certain routine efforts to relieve pain tend to increase the need for operative interference and to multiply the danger of infection and other complications. It has been definitely shown that the main cause of mortality in childbirth is related to the labor, rather than to the prenatal period. This does not mean that prenatal care is unimportant, but it means, rather, that the act of delivery itself requires the most expert attention, and that not enough attention has been paid to this fact.

Parents must realize that labor is a normal process and that its successful termination is not

dependent upon the unrestrained use of anesthetics or the operative dexterity of the attendant. It is true that no two deliveries are quite alike. But if we exclude those cases of abnormality, which generally can be known in advance, that mother is safest who bravely determines to see her ordeal through with the expert care of a physician who is in no hurry, has good judgment, patience, and the skill due to experience. Obstetrics is not only a science, it is an art, and the record of the physician selected for the successful practice of this art is the most important factor in a safe delivery. Wisdom lies in using care to select the physician, and then reposing in him full confidence. He will know whether or not anesthetics or instrumentation are needed, and the patient who tries to prevail upon him to use them unnecessarily is making an attempt to render entirely painless a process from which pain cannot be wholly dissociated without a sacrifice in safety. Childbirth in its simplest aspect is a sundering of one living being from another by a muscular propulsive action, on the part of the enclosing organism, which is not unlike the peristaltic waves of digestion. Pain seems to be a natural and necessary accompaniment of such a normal severing, and it is quite clear that anodynes, which quiet pain, may also inhibit muscular contraction and require a resort to instruments with their attendant risks.

(2) *The Physician.*—When our American women started to go to hospitals in increasing numbers to have their babies, this was hailed as a solution to the problem of high maternal death rates. It was generally assumed that the hospital was safer than the home. But there is abundant evidence that a hospital confinement is not necessarily a safe confinement and, in fact, that the degree of safety varies as the hospitals and their attendants vary in quality and competence. The doctor selected by the prospective mother and father to conduct her confinement, assumes a great responsibility. His attentions should begin in the early months of pregnancy and before the time for labor comes he should know whether this is likely to be normal or difficult. A certain proportion of accidents are unavoidable, but these have been shown to be small in number compared with those complications which may be attributed to carelessness, to unskilled or untimely interference, or to improper environment. If we have determined that many deaths may be avoided by giving nature a chance, a knowledge of the bad effects of improper methods of delivery should become more widespread. Accidents and abnormalities, it is true, do occur unexpectedly. The physician should be ready for them. But he should anticipate their appearance. Many can be recognized long before delivery. This may require skill, but its exercise at an early time will often prevent unfortunate consequences. I have every confidence that in the future the skill and standing of the obstetric attendant will be judged less by his operative dexterity than by his ability to conduct a labor in accord with the normal mechanism of this process, unless specific indications warrant interference.

The obstetrician has developed as a specialist in comparatively recent times, but a very considerable number of confinements even now are still in the hands of the general practitioner, and he will do very well with them if his mind is not disturbed by the importunities of the patient or his desire to resort to short-cuts in terminating labor. What we need is better knowledge of the physiology of pregnancy, and of the natural forces concerned with childbirth, rather than with the means of circumventing them.

It is a great satisfaction to record that the medical profession is accepting more and more fully its responsibility for improving conditions. Physicians in high standing in many places in this country are devoting a great deal of time to looking into the cause of maternal deaths in their communities and are actively directing efforts to improve the available maternity facilities. One of the outstanding characteristics of the medical profession, and one often misunderstood by the public, is a willingness to criticize itself and unthinking persons may seize upon this attitude to accuse the physician of culpability. Naturally there is no relation between these, and the effort is worthy of commendation rather than condemnation.

(3) *The Nurse and Midwife.*—In order to learn how much nurses really know about maternity care, a sub-committee of the White House Conference on Child Health and Protection, which convened in 1931, submitted two questions to a selected list of nurses deemed to be above the average. The first called for a description of adequate maternity care; the second asked how maternal mortality could be prevented. Answers to the first question revealed little understanding; for example, among 1,622 nurses only 17.9 per cent mentioned, as an essential element in that care, a physical examination, followed by continuous medical supervision during pregnancy. Very few an-

swered the second question in a manner to indicate any real knowledge of the causes of maternal mortality, or of the means of reducing it.

The part the nurse or midwife may play in maternity care need not be considered further, although I do wish to call attention to one fact. If the public and the medical profession were to encourage adequate education of nurses and midwives so that they could do for us in this country what they do in many foreign countries with death rates less than ours, some of the difficulties in improving maternity care would disappear. The competent midwife remains at the bedside of the expectant mother from the first signs of labor until the delivery. This may be anywhere from 5 to 20 hours. If properly educated, experienced, and supervised, the midwife could act as a valuable assistant to the physician in all normal cases, and if, through a wide experience and training, she became able to recognize instantly the need for the presence of the physician, the element of risk would be greatly reduced.

(4) *The Medical Educator.*—There is less attention paid in our medical schools today to teaching students proper obstetric practice than there is to surgery and certain minor specialties. The average recent graduate will certainly do more deliveries than he will appendectomies, yet he gets very inferior preparation for the former.

A large part of the instruction in obstetrics in our medical schools has been along radical and operative lines, so that many students gain the impression that the greater part of obstetrics is operative. They may have seen these procedures carried out by experts with ease and skill, and subsequently they have attempted to practice them with unsatisfactory results. To avoid these results and impressions greater stress must be laid on the conduct of normal labor, and each student must personally attend under competent guidance and supervision a larger number of confinements than is required by law in many states at the present time.

Finally, the Public.—It is only when an aroused and interested community begins to ask questions that proper attention will be given to improving the situation which we are discussing. I firmly believe that an inventory by the community of its obstetric facilities will do much to engender a spirit of cooperation between those most closely interested, the prospective mother and her attending physician and nurse.

Especially is the public as a whole concerned with the high hospital death rate. Of course, the serious cases go to hospitals, but unfortunately all institutions commonly known as "hospitals" are included in this designation, of which many are poorly equipped and poorly managed and should not be permitted to take confinement cases. Of the community's duty to demand and require regulation and supervision of these institutions I shall speak later.

I have considered in detail the various factors to which can be traced the responsibility for adequate maternity care; it is only through this knowledge that the public, in any given community, will be in a position to aid in relieving the situation. Community efforts should be based on the fact that adequate maternity care depends on attacking the problem as a whole and not upon undue attention to any one phase. It is quite possible that the widespread appeal for prenatal care in recent years has overbalanced the attention given to the actual delivery, and yet it has been amply demonstrated that this is the period which requires the closest observation and the most skillful attendance. Improvement will not come in all these matters until the wish for it is widespread. This, in turn, cannot be achieved until we are all made aware of the seriousness of the situation, and of what is needed to make it less serious. Then, through the cooperation of the groups to whom may be traced various types of contributing responsibility, which include the husband and wife, the physician, the nurse or midwife, the medical educator and the general public, adjustments and readjustments can be made to take that obvious, clear, but difficult step, the transmuting of knowledge into practice.

And in attacking the problem of improved maternity care we must bear in mind certain wider aspects of this matter. Conservation of life and health constitutes one of the signal scientific advances of this country. Constant endeavors have been made to reduce the hazards of industry, of travel, of epidemic diseases, and of many things that may affect adversely our daily existence. We must provide equal safety for our prospective mothers. This seems more necessary than ever at the present day, when the acknowledged reduction in population growth has become so evident that Dr. Louis I. Dublin, a foremost authority, has estimated that our national growth will come to a standstill in about 20 years, and then deaths will outnumber births.

Consequently, the life of the every woman engaged in this noblest function of her sex must

be conserved and preserved, so as to overcome the inroads of that increasing condition of sterility and lowered birth rate which is due not only to natural causes associated with our advancing civilization, but to those artificial barriers to conception which have made such marked, perhaps unfortunate, progress in recent years.

We have reduced the mortality among infants, now let us do as well with their mothers, whose lives and restoration to normal activities after childbearing are among the most important assets of the nation. And having reached this point in our discussion, by what practical means shall we bring about a change?

The statement is sometimes made that American women are less able to bear children successfully and without assistance than those of other nations. I believe it would be difficult to prove this. It has been shown, however, by well-authenticated surveys, that we resort to operative interference with labor more frequently than elsewhere, and that this tendency has grown with the increasing resort to institutional deliveries. Does this mean that natural and spontaneous labor is declining, or that the ease of ending the process by mechanical procedures in a hospital has influenced the judgment of the attendant?

If we examine the recent reports on maternal mortality we are struck by a similarity in their findings and recommendations. The authors stress lack of adequate prenatal care; the all too frequent occurrence of hemorrhage; sepsis and toxemia; the unfortunate results of anesthesia and analgesia in labor; the constantly increasing incidence of operative deliveries, often by incompetent hands, and the high fatality rate which attends them. For example, Cesarean sections preceded death in about one-fourth of all women who died following operations for delivery. Almost 50 per cent died from post-operative sepsis. This suggests either incompetence in the operation, or misjudgment in the decision to operate. It suggests certainly that of the many deaths in childbirth, perhaps 50 per cent are preventable.

The published results of research in American obstetric practice have been severely criticized as untrue and unfair, and have even been exposed to ridicule in some of our medical journals. In the same spirit the natural hazards of pregnancy have been magnified as an excuse for our high death rate; as an actual fact, the so-called accidents constitute a very minor proportion; not over 9 per cent in New York City's survey, for example, could be designated as unavoidable fatalities. Perhaps the criticisms of modern American obstetric practice with which we have been favored in recent years may be deemed too severe and unjustified. If disseminated without restraint, such criticism might, it is true, lead to lack of confidence by patients in the medical profession, and to actual fear of pregnancy and its accompaniments. That need not be so. Obstetrics in this country is practiced with the greatest possible skill in many places, and by many physicians; rather, the difficulty rests in the lack of appreciation by the profession as a whole of the seriousness of operative interference, of the need for careful supervision of the entire period of pregnancy, and of the necessity for cooperation between physician, patient and community. The problem of the physician concerns his education and his conscience; it need not be further discussed here. We may say, however, that this task is, and will be, overcome because we have the remedies at hand; they have been quite genrally acknowledged and are being carried into effect.

The problem relating to the patient and the community cannot be solved so readily, because they require cooperation and a new understanding of the situation, both of which are less easy to attain.

Briefly summarized, the entire question resolves itself into an appreciation of the dignity of parenthood, of the value and need for educating the prospective mother in the facts of pregnancy, in providing her with adequate maternity care through physician, hospital or midwife. These problems require the assumption of a certain degree of responsibility by the community, for public opinion alone can bring about the adoption of recognized standards of practice by the attendants of the woman in labor, doctor, nurse, midwife or hospital. Again you will ask, how may this be accomplished?

The community should see to it, in the first place, that the facts are known, and in the second place, that they are acted upon. The mortality rates associated with childbearing must be used, not for the purpose of instilling fear into the public, nor for securing their improvement by legislative enactments, but as a wholesome source of instruction for both patient and physician.

It is essential, in the second place, that the pregnant state be regarded as a natural phenomenon, not as a disease. Therefore, as has been

said, the physiology of pregnancy and labor must be thoroughly understood by the physician. This demands, above all, a proper and satisfactory course of instruction in medical school and hospital. The community must then provide ways and means for the physician to apply this skill and knowledge. Let me refer to a few instances in which the facts are known and are being used as the basis for action. New York has made public its own report on puerperal mortality and, as one result, the Commissioner of Health has appointed an Obstetric Advisory Council made up of physicians and of representatives from interesting lay agencies. The council will endeavor to carry out some of the recommendations made in this report. A survey will be made of institutional facilities for maternity cases, with special reference to environment, equipment, adherence to accepted standards, staff organization and control; proprietory hospitals and nursing homes will be supervised and regulated; prenatal care services throughout the city will be revised; a thorough inquiry into midwife practice will be conducted; instruction of the public will be undertaken by an information bureau, organized by the County Medical Society, where prospective patients may be referred for competent obstetric care.

This seems a large undertaking, and undoubtedly it is for a city like New York. Ohio, however, has developed a society for similar purposes; Essex County, in New Jersey, has organized its maternal welfare work under a medical commission, and there are undoubtedly other communities which have attempted or carried out schemes for improving their obstetric facilities. But we need a wider awakening and I believe that definite results can be achieved only by further local efforts, efforts which are based on the determination of each community to know its own conditions and then attempt to remedy them. If communities over the entire country would proceed to assess their obstetric facilities as they do their water supply and other public necessities, there would soon grow up a better appreciation of good maternity care on the part of the public, as well as the physician.

As hospitals constitute an important factor in obstetric care, their survey in any given community may serve as a beginning in the campaign. Standards of practice must be developed and these may be based on those already worked out by the American College of Surgeons. Their adoption by any given institution must be governed to some extent by local conditions. They are briefly as follows:

(1) Segregation of obstetric patients from all others in the institution.

(2) Special facilities available for immediate segregation and isolation of all cases of infection, temperature, or other conditions inimical to the safety and welfare of patients within the department.

(3) Adequately trained personnel, the entire nursing staff to be chosen specially for work in this department and not permitted to attend other cases during obstetric service.

(4) Adequate and readily available laboratory and special treatment facilities under competent supervision.

(5) Accurate and complete clinical records on all obstetric patients.

(6) Frequent consultation encouraged on obstetric service, a consultation made obligatory in all cases where major operative procedures may be indicated.

(7) Thorough analysis and review of the clinical work of the department each month by the medical staff with particular attention to deaths, infections, complications, or such conditions as are not conducive to the best end-results.

(8) Adequate theoretical instruction and practical experience for student nurses in prenatal, parturient and post-partum care of the patient, as well as in the care of the new-born.

In addition, provision should be made for the admission of outside practitioners to courtesy hospital privileges under definite regulations.

The medical profession should fire the starting gun in this local survey through the medium of its accredited organization, preferably, perhaps, a county society. A maternal welfare committee which would include interested and representative lay persons could readily undertake a study of community obstetric facilities, and after determining their character and extent, compare them as far as possible with such accepted standards as those already referred to. This would furnish an estimate of what is needed and serve as a focus for further efforts to supply the missing facilities. I fully believe that if a community endeavors to assess its facilities, hospitals, practitioners and nurses, through the medium of a representative maternal welfare council, that there will come a response, that the laity

will be more appreciative of the need and value of good obstetric care, that the physician will recognize his responsibilities more definitely, and finally, that it will allow us to look forward to a time when deaths from childbearing will be limited largely to those unavoidable accidents and complications over which, during the present time, at least, we have no satisfactory control.

PROGRESS AND PROBLEMS IN GYNECOLOGY*

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It is with a diffidence not manifest in the title of this paper that the contributions made to gynecology and the problems that confront the gynecologist are presented in so short a paper. We are eager to achieve victory over our problems by one great stride, but scientific growth is attained slowly and with difficulty. It is the product of many small contributions brought laboriously by many earnest and indefatigable workers. So slow and gradual is this growth that many years must pass before an accurate evaluation can be placed upon many of these contributions. Years more are lost before general acceptance embraces many proven additions to our knowledge. A debt of gratitude is due to those who, by their frequent papers and case reports, force upon us an acceptance of things they have tried and found good. In this matter only is the dissemination of the new slowly achieved. On the contrary, our problems, like the immortal poor, are always with us; closest when least observed. These problems should be brought out frequently and paraded before our mind's eye that we may the more readily recognize them. They should not stand, ghost-like and unobserved, at our elbow in the treatment rooms. Every physician should be constantly aware of them.

ENDOCRINE PREPARATIONS

During the past ten years the hormones of the female sex glands have found for themselves a secure place in the gynecologist's armamentarium. Although much confusion exists in regard to their use in many conditions, and although the bountiful promise of experimentation has not been fulfilled in clinical work, no one can doubt that their accession to a place in our therapy has been a great contribution to gynecology. A product of the laboratory, they have been true to the hand that nurtured them, and in the laboratory they have been of unquestioned value, giving us an early and infallible diagnosis of pregnancy and chorionepithelioma. Their therapeutic value has been doubted by some; the laboratory worker, especially, has questioned the optimistic reports of the clinician and ascribed his reported successes with endocrine therapy to spontaneous recovery, improvement in general condition, or correction of dietary errors. Notwithstanding this skepticism on the part of our friends of the laboratory, clinicians are generally in accord as to the value of the hormones of the female sex glands in certain conditions. Novak and others have constantly stressed the value of the anterior pituitary-like hormone in functional bleeding. This hormone is most effective in functional bleeding of the adolescent and has definitely removed these unfortunate young women from the menace of radical doses of radium. In 1931 at New Orleans, Novak gave before this Section an excellent address on "Functional Bleeding." No commercial preparation being available at that time, upon my return to Atlanta I injected into the gluteal muscles of a young girl suffering from functional bleeding, blood withdrawn from her sister, who was at that time pregnant. This procedure was continued until the anterior pituitary-like hormone of pregnancy urine (antuitrin-S) became available in Atlanta shortly thereafter, in March, 1932. The injected blood was fully as effective as the antuitrin-S has later proven.

In functional bleeding occurring near the menopause there must be a distinctly different causal factor, as the response of this type of bleeding to the administration of the hormone which is effective in the adolescent type is very disappointing. Although many clinicians have reported effective results from its use, the writer has little faith in its value for this type of bleeding, and has usually found it necessary to resort to radium or the roentgen ray.

The estrogenic hormone has not attained such a secure place in the gynecologist's esteem. In no instance are we willing to rely upon it with the confidence that attends the use of the anterior pituitary-like hormone in functional bleeding. However, this hormone is certainly of great value in relieving the unpleasant subjective symptoms attendant upon a precipitated menopuase and frequently accompanying the normal menopause. Frequently used in cases of amenorrhea, either

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alone or in association with the anterior pituitary-like hormone, it has yet to prove its value in restoring the menstrual function when used in a dosage economically practical. Much more detailed attention is now being given to these cases of amenorrhea and a corresponding improvement in results is being secured. The obese, hypothyroid amenorrheic with a basal metabolic rate of minus twelve or lower finds a happy gynecologist, for a favorable response to thyroid medication can be expected in most cases. The obese amenorrheic with a normal, or approximately normal basal metabolic rate frequently responds favorably to the correction of her dietary errors with a reduction of her weight. A great amount of the estrogenic hormone is being used in amenorrhea of this type and unless great good judgment is exercised in the evaluation of the relative importance of the various measures and remedies employed, undue emphasis may be given to some measure or preparation touted as being of specific value.

We stand upon the threshold of the realm of these hormones. We cannot project ourselves into the future and see how they will be ultimately valued and used. We know they hold promise of much good, but we have so far given little attention to the possible harm they may bring to our patients. Warning voices may be heard. It is our duty to exert every effort and resource available to make a definite diagnosis in each case and to use these hormones only when there is a specific indication for their use and only after organic disease has been definitely eliminated. Used indiscriminately, they will make of us poor gynecologists. Used well and wisely, they will improve our diagnostic acumen and therapeutic results.

CANCER OF THE CERVIX

Schiller's test may be considered a most valuable contribution to gynecology. Its value in the diagnosis of early carcinoma depends upon the fact that the normal mucosa of the portio vaginae is rich in glycogen, which the iodine of Lugol's solution stains a dark mahogany brown; while carcinomatous cells, containing little glycogen, stain poorly and appear as pale, lighter colored spots. In applying the test the technic used by Graves[2] has proven superior to Schiller's original technic in my hands. Graves exposes the upper vagina by the use of retractors or a speculum and presses a thick swab, saturated with Lugol's solution, firmly against the anterior lip of the cervix, flooding the upper vagina and completely covering the cervix with the solution. Realizing that the dark brown stain is due to the glycogen content of the normal stratified squamous epithelium of the portio vaginae, it is readily appreciated that any condition that removes a portion of these cells or replaces them with cells of low glycogen content will present a spot of suspicious appearance at the point affected and must be distinguished from an early cancer. Ulcerations; erosions or denudations, the result of trauma or disease; will appear as pink, unstained spots, as they have no epithelial covering and do not take the stain. The everted glandular epithelium of the endocervix, being poor in glycogen content, does not take the stain. Areas of hyperkeratosis due to leukoplakia, luetic infection or the result of prolapse appear as light poorly stained spots. Every poorly stained or unstained spot should be regarded with suspicion and a strip of epithelium should be lifted off or the surface layer removed with a sharp curette and placed in a hardening solution for the pathologist's examination. Fortunately, a newer pathology attends. With greater familiarity of the pathologist with cell pathology a smaller piece of tissue suffices. He searches for frequent mitotic figures, hyperchromatism, neoplasia and anaplasia. Variation in the size and shape of the different cells and of their nuclei carries a significance unrecognized only a few years ago. Principally because of the wonderful work of MacCarty on cytology, trustworthy diagnosis may be made from a smaller fragment of tissue than was formerly necessary.

The utility of the Schiller's test is not limited to the virtue inherent in the test. In addition to the fact that this test will make cancerous lesions manifest earlier than they would otherwise become suspected, the Schiller test is of the greatest psychological value to the gynecologist. With surer mind he can insist upon routine examination, feeling secure in his ability to demonstrate suspicious lesions and to recognize a cancer before it becomes infiltrative. Its utility is limited somewhat by the fact that there are only a few of the larger medical centers where pathologists are willing to assume the responsibility of a diagnosis of malignancy upon a basis of cell pathology. Although many doubt the wisdom of a decision based upon such a study alone, it is only by such a diagnosis that carcinoma of the cervix can be definitely discovered in the surely curative period. A diagnosis based upon tissue pattern is a diagnosis that has waited for an infiltrative lesion and the intervening time has multiplied a hundred fold the probability of metastatic lesions.

The problem presented by the mortality due to cancer of the cervix uteri is a challenge to every gynecologist. Four of every five women who come to the gynecologist suffering from cancer of the cervix will die from cancer of the cervix. No more forceful comment can be made in regard to the lack of efficacy of the present measures used in the treatment of this disease. The hopelessness of the therapeutic resources available is more manifest when it is realized that there is now more nearly an unanimity of opinion in regard to the measures to be used in the treatment of cancer of the cervix uteri than there has ever been before. Nothing is to be gained by a discussion of the therapeutics of cervical cancer.

This problem cannot be solved from a consideration of its therapy. Radium, roentgen rays and surgery are alike of little avail. A successful attack must be directed from a different angle.

One of the greatest achievements in recent medicine has been the decrease in infant mortality secured by the pediatrists. The importance of keeping the baby well is stressed. Frequent routine examinations are recommended and their value is emphasized. By like measures gynecologists can secure a decrease in the mortality of cervical cancer. Heretofore an attempt has been made to have the woman become aware of the cancer and seek treatment early in its life cycle. The importance of irregular bleeding and of "spotting" as danger signals has been emphasized in our talks before parent-teacher associations and women's clubs. Such emphasis is not properly placed. Emphasis must be placed upon the routine gynecological examination. Insistence must be placed upon the necessity of every woman's having a competent gynecologist examine her cervix when she becomes thirty years of age and at intervals of six months thereafter. Conditions that are known to play a part in the etiology of cancer should be treated. Cervices that show lacerations with scar tissue should be repaired. Cervices showing cervicitis should be treated by linear cauterization and, if prompt healing fails to take place, the cervix should be amputated and submitted to a pathologist for the examination of serial sections. Cervices showing suspicious lesions with Schiller's test should be given the benefit of a pathologist's opinion of the tissue removed from the suspicious area. The "thin, acrid discharge," "spotting" and hemorrhage should not be considered as signs of early cancer. Although these are the signs that the patient first notices in a large number of cases, such signs appear to the gynecologist as the red seal of her death warrant. The latent period, the interval between the first appearance of the cancer and the time when it becomes manifest by sign or symptom, is too long. The cancer has become infiltrative before the patient can possibly have any knowledge of it. The problem of cancer of the cervix can be solved, but only when the gynecologist takes the initiative in the matter of routine periodic examinations. Cancer must be prevented or found during the latent period.

In discussing a paper by Schmitz,[3] Bloodgood stated:

> "Ultimately, in the majority of cases, cancer of the cervix should be found by the microscope, and when it is found in this early stage the chances of a cure by physicians properly trained in the use of radium should be more than 90 per cent."

It appears logical to take exception to the word "ultimately." It is within the power of organized medicine to accomplish such results at the present time. The necessary knowledge and resources are available. The problem of cervical cancer can be reduced to 90 per cent of its present formidable proportions by routine periodic examinations, but never if the woman is taught to wait for some sign or symptom to send her to her doctor. Not only gynecologists, but every physician should be familiar with the technic of Schiller's test. He should use it as a routine and should insist that proper care be given to every lesion which is suggestive of cancer. Many, many lesions, not cancerous, will come into the gynecologist's office, but many really early cancers will also come into his office.

CONTRACEPTION

Involuntary sterility or sterility of necessity has been much discussed in recent years. It is beyond the scope of this paper to burden you with a consideration of its etiology or treatment which you know well. Birth control and sterility are, in their ultimate effect, closely allied and the sociological aspects of the problem presented by the combined effects are of greatest importance. Those patients who come seeking relief from an involuntary sterility are invariably those whose offspring would become desirable citizens. Those who are reached by the propaganda for birth control and who practice birth control successfully are those among whom such measures should be least employed. Unquestionably there are innumerable instances in which measures of birth control should be used, but birth control by education of the layman or by

publicity or propaganda is inherently harmful. It is impossible to prevent the use of contraceptive measures by persons whose birth rate should be increased, if knowledge of such measures is available to them. Hirst[4] stated that contraception and the dissemination of knowledge of contraceptive practices has passed beyond our control. There are at least fifty different contraceptive jellies on the market and pamphlets and leaflets describing their usage are left with the druggist with instructions that he wrap a leaflet in his packages. Drug store windows are dressed, using 'marriage hygiene" as a motive and featuring different contraceptive jellies and devices. Unfortunately, detail men representing manufacturers and jobbers do not hesitate to approach the physician in an attempt to enlist his aid in the sale of these products. Such activities tend rapidly to increase the proportion of the mentally inferior in our population and to make inevitable the day of a communistic form of government in this country. It has been predicted that we are less than three generations from domination by the mentally inferior.

As gynecologists, let us beware of participation in the distribution of such knowledge. Let us rather, by friendly word and counsel, counteract as far as we may the pernicious influence of this propaganda. The young wife comes to us fresh in love and harboring the idealism of youth and love. A word or two of advice at this time is of inestimable value to her. The success of her venture into matrimony, her husband's continued love and respect, the happiness of her life and our country's future may depend upon the few words of advice given. There is a duty of patriotism, in peace as in war, and it is now the imperative duty of the so-called better classes to increase the proportionate number of their offspring. Let us encourage this and let us combat the vicious effects of the propaganda for birth control as actively and energetically as the opportunity of our profession permits. Southern gynecology has an enviable, a proud record. Lustrous names adorn a glorious path. The heritage of high accomplishments invites to noble thoughts and to good deeds.

DYSMENORRHEA

The sum total of suffering from dysmenorrhea is probably greater than that from any other one ill to which woman is liable. Approximately 50 per cent of all women suffer from pain at the time of menstruation and 17 per cent from pain sufficiently severe to incapacitate them in some degree. Dysmenorrhea has been divided into two types: essential or primary and a secondary type. The latter is associated with some demonstrable pelvic disease upon which it is dependent and it is commonly susceptible to successful treatment. In fact, it may be said that a dysmenorrhea which no longer appears after all unquestionable pelvic disease has been relieved may be considered a secondary dysmenorrhea, while a dysmenorrhea which is present when no pelvic disease can be determined or which persists after the correction of all positive pathologic conditions may be termed an essential dysmenorrhea. No commentary upon essential dysmenorrhea can give a more exact picture of the status of our knowledge in regard to its etiology than the fact that its differentiation from secondary dysmenorrhea depends upon these facts. Many theories of etiology have been suggested, but behind each stands this spectre of differentiation.

Although it appears to be illogical to believe that the unclotted menstrual blood should meet with obstruction sufficient to be productive of expulsive efforts that would cause pain, this view is probably the oldest and most widely accepted. Novak has done much to render the support of the mechanical obstruction theory an uncomfortable and difficult position. He has computed that only about two-thirds of a drop of blood a minute is passed in the average normal menstrual flow, and has demonstrated that a probe can be readily passed into the uterine canal during the height of the menstrual pain, without meeting obstruction.

Hypoplasia of the female genital organs, especially of the uterus, is thought by many to be the chief factor in the production of essential dysmenorrhea. But a careful analysis would seem to render such a theory untenable. The hypoplasia may, in certain instances, be indicative of a constitutional status. It cannot be considered as a condition parallel to and not related to the psychogenic factor in other cases. Particularly is this true if the patient is aware of the under-development of her genital organs. Frequently a hypoplasia is found in women who do not suffer from dysmenorrhea and in numerous instances the dysmenorrhea appears after the patient has enjoyed many years of painless menstruation.

There can be small doubt that constitutional factors play a part in a great number of cases of dysmenorrhea, as many cases are improved and some completely relieved of their pain by measures directed entirely toward the improvement of their general health. Such patients may

harbor a lowered threshold of pain which improvement in the general health tends to raise. It is possible in these cases that the disregard of the pelvic condition on the part of the physician and his advice to continue the usual routine of exercise during menstruation minimize in the patient's mind the importance of her menses and enable her to disabuse her mind of the exaggerated idea of their importance which she had held. Thus, the psychogenic factor enters into the cure, which is usually considered an accomplishment upon a purely constitutional basis.

The psychogenic factor is important in every case of essential dysmenorrhea and the leaven in many remedies is confidence in the physician who administers it. For this reason, it is imperative that the adolescent girl should not be permitted to attach too great importance to the appearance of her menses. It should be regarded by her as a normal function and not as a phenomenon of great significance. However, much injustice and unnecessary suffering will be permitted if essential dysmenorrhea is considered to be purely a manifestation of hysteria. Such an attitude cannot be condoned, in spite of essentially negative results in special and general examinations.

Recently Novak and Reynolds[5] have done much work upon the relation of the female sex hormones to primary dysmenorrhea as etiological factors. Much ingenuity has been manifest in their determination of the effect of these hormones upon uterine contractility and the authors believe they have offered evidence to indicate that the immediate cause of the dysmenorrhea is the exaggerated and painful contractility of the uterine musculature. They reach the conclusion from their studies that progestin and the prolan-containing substance prepared from the urine of pregnant women have an inhibitory effect upon the uterine contractility and are indicated in essential dysmenorrhea.

The treatment of essential dysmenorrhea remains the problem it has always been. Its treatment is based entirely upon empiricism. The abundance of remedies bespeaks the poverty of their quality. Those measures used solely for the purpose of relieving pain will not be considered in this discussion, although relief from pain will always remain the physician's obligation. Those measures and remedies used with the hope of curing the condition have been directed somewhat by the conception of the etiology entertained by the originator of the particular type of treatment used. Thus, mechanical obstruction being one of the oldest and most widely held theories of the cause of essential dysmenorrhea, dilatation of the cervix uteri with the addition of special individualized additions is one of the oldest and most widely used measures for its relief. It may be said further that adequate dilatation of the cervix uteri is probably the most dependable measure available at the present time.[6] Although the relief afforded is of a temporary nature, persisting from a few months to eight or ten months in the average case, and, although a few cases apparently receive no benefit from dilatation, it is probable that if only one measure were allowed, dilatation would be the procedure of greatest choice.

In cases associated with definite hypoplasia and in which organotherapy would seem to be indicated, such treatment has not proven of value in the writer's experience. It is probable that treatment of this kind should be administered before the genital organs reach maturity in order to prove effective. This is difficult, as the menstruation with which the discomfort is associated is a harbinger of maturity and the approaching maturity, by preemption, robs this remedy of any therapeutic value it might have possessed.

Attention to the general health of the patient, relief of anemia, and talks and measures directed toward removal of the psychic factor are of great value in every case. Many cases are relieved by these measures alone. All cases should receive such attention before resort to operative procedures is considered. Unfortunately, there remains a large number of intractable cases, persisting after all of the usual measures have been tried. In such cases we entertain the thought of more radical measures, such as radium emanation, x-ray therapy and hysterectomy with regret for the necessity which compels their use. In the distinctly hypoplastic cases such measures are used with less hesitancy than when examination reveals a uterus of normal size capable of fruition. Recently many reports of favorable results after resection of the superior hypogastric plexus for relief of intractable dysmenorrhea have been made, Wetherell,[7] Adson and Mason[8] and others being well pleased with the results obtained. It would seem advisable to resort to this procedure in preference to radium, roentgen ray or hysterectomy, but to consider it as a radical measure to be employed only after the failure of all palliative remedies and of less radical operative procedures. The writer has not personally made use of presacral neurectomy,

but is favorably impressed with its possibilities and will not hesitate to use it in preference to more mutilating measures.

Primary dysmenorrhea presents a major problem for investigation. Why does pelvic disease produce painful menstruation in many cases? Why does the pain in these cases cease after removal of the pathologic tissue? What explanation can be offered of the mechanism of pain production in secondary dysmenorrhea? Is there an essential difference between primary and secondary dysmenorrhea? If so, does a primary dysmenorrhea become a secondary dysmenorrhea when a cure is effected? These and many more questions present themselves to the thoughtful observer and a realization of the great need for knowledge in regard to the etioloy and treatment of dysmenorrhea comes to him.

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THE RELATION OF TRAUMA TO ABORTION, PREMATURE DELIVERY AND UTERINE BLEEDING*

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The officials of the great corporations as a rule are men of intelligence, character and sense of justice. Their legal departments are in charge of jurists of large experience who know the law and apply the rule that honesty is the best policy. The majority of claims on a corporation are, like those on the Government, either fictitious or are much exaggerated. It is therefore natural that they are skeptical concerning any complaint that is brought before them. One distinguished chief counsel told me that it was his policy always to settle any just claim out of court, but to fight to the limit the fictitious and the exaggerated ones. He also remarked that he had the machinery and the talent among his staff to carry this out. The laity and some of our profession believe that trauma is a frequent cause of abortion, precipitate labor, and uterine bleeding. An attempt will be made in this paper to clarify the subject and to present both sides of the question. The conclusions arrived at are based on a study of the literature and an experience in this line of work that covers many years.

Before going into the subject let us review briefly the physiology of menstruation, ovulation and conception. The normal woman menstruates every twenty-six to thirty days with a duration of two to seven days. There are to this rule, as to every other, many exceptions, and for this reason great stress is placed on a most careful history from the menarche up to the time of the first consultation. The normal woman ovulates (lays an egg) midway between the periods. This egg or ovum lives for only two days, and for this reason the modern view that conception can occur during only two to three days in a month is correct. Certain changes occur in the uterus for the reception of this egg or ovum. Nature each month builds a nest to receive the fertilized ovum and carry it on to full maturation. Should conception fail to occur the nest breaks down and menstruation takes place. The ovaries control this cycle through their internal secretions. At present there are two known hormones derived from the ovary. One is spoken of as the female sex hormone or estrin and is derived for the most part from the ovarian follicles. This hormone is secreted throughout the intermenstrual period. The second hormone is only found after ovulation. A yellowish body is formed at the site of the ruptured follicle that produced the ovum, spoken of as the corpus luteum, and it is from this that the second hormone is derived, which is spoken of as progestin. The corpus luteum also produces a small amount of estrin. Estrin controls the changes in the uterus up to the time of ovulation and then the premenstrual changes are brought about by the action of both estrin and progestin. If pregnancy is not present and ovulation fails to take place, the endometrium is stimulated by estrin alone and a hyperplasia occurs, which is one of the most common causes of uterine bleeding. These cyclical changes in the uterus can be studied by making biopsies and examining the tissue. It is

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a most useful procedure in making a diagnosis of obscure uterine bleeding. One can by this method eliminate malignancy, but also tell the stage of the cycle and whether ovulation has taken place, which is most important in the study of uterine bleeding and sterility. While the ovaries control the changes in the uterus they are stimulated by a hormone or hormones from the anterior pituitary spoken of as prolan. These two glands have a reciprocal effect. The anterior pituitary stimulates the ovaries and estrin, one of the ovarian secretions, depresses the anterior pituitary. This reciprocal action is believed to exist between the ovaries, thyroid and other glands of internal secretion.

Uterine bleeding is a most common condition and in 85 per cent of cases is due to one or more of the five common conditions: cancer, abortion, fibroid tumor, extra-uterine pregnancy and endocrine conditions. I have impressed upon my students these five common causes of bleeding by making them remember the word "Cafee," each letter in the word standing for one of the five etiological factors. By remembering this word and for what each letter stands, one can, by getting the age of the patient and a careful history have a fairly good idea of what he will find on pelvic examination in many cases.

The most common condition producing uterine bleeding is hyperplasia of the endometrium and one can see from a study of the physiology of ovulation that it is an impossibility to produce this by trauma.

Gynecologists sometimes express from the ovary during operation a fresh corpus luteum for the purpose of study. This is invaribly followed by menstruation.

The veterinarian also produces pressure on the ovary *per vaginam* in cattle for the purpose of making them more fertile. It can be easily seen that trauma in the human being cannot produce uterine bleeding unless direct violence is exerted on the ovary or the uterus.

It is conceivable that trauma might cause a twist of the pedicle on an ovarian cyst or a submucous pedunculated fibroid and uterine bleeding might occur. It is an accident that I have never seen, but it is in the range of possibilities. The woman with gonorrhea associated with an inflammatory disease of the appendages might bleed following a severe trauma. This is also a rare incident. Crossen mentions that menorrhagia may be caused by functional pelvic congestion, for examples, from certain occupations, long automobile rides, violent exercise, recent marriage.

Graves mentions that menorrhagia may be due to excessive or abnormal coitus. The more modern text-books, Bland, Davis, Curtis, Lewis' System, make no reference to trauma as producing menorrhagia.

Let us now consider what effect trauma will have on abortion or premature delivery. Curtis says:

"The popular belief that trauma is a principal factor in abortion is hardly tenable, for we know that the uterus will endure shocking traumatic insults without aborting. Even after a large majority of surgical operations upon the pregnant woman, the uterus makes no attempt to expel its contents. The author has operated on many pregnant women with a negligible number of abortions. He once removed a very large bone hairpin from a three months pregnant uterus by a vaginal hysterectomy, followed by no attempt at abortion. While trauma is an undoubted cause of abortion, its influence has been greatly overestimated.

"If the ovum be carefully examined in cases attributed to accidents, it will usually be found that death of the fetus antedated the trauma and that the real cause of the abortion was the condition that caused the death of the fetus.

"Trauma sufficient to rupture the membranes is an undoubted cause of abortion (Huntington). In most cases there must be something more fundamental than trauma, as is shown by the ease with which some women abort after the slightest shock, while others endure the grossest manipulations with impunity (Datnow). Abernethy could be certain of traumatic etiology in only 4 per cent and doubtful trauma in 20.8 per cent of his cases.

"That those uteri which abort so readily are highly irritable is hardly a satisfying explanation when we recall the fundamental causes of abortion."

DeLee says:

"Trauma or violence is very frequently advanced by the patient to explain the accident, but unless it is applied to the uterus direct, we must assume that one of the predisposing causes, endometritis, *etc.*, is really active. A special predisposition must exist to explain those cases where a slight jar, a misstep, a nervous shock, an automobile ride, and other mild occurrences bring on abortion. On the other hand, the severest injuries, mental and physical, are sometimes inflicted on the gravida without disturbing the uterus. Thomas quotes a case where a pregnant woman jumped from an upper window, falling through a shed on to a stone flagging, but carried through to term. He also reports another case where a heedless boy threw a dead, bleeding, black snake around his sister's neck and, in spite of the fact that she suffered from hysteric syncope and convulsions for several days, the pregnancy, then at four months, went to term. The child was not 'marked.'

"Excessive coitus is a frequent cause of abortion in the newly married. Either the absorbed spermatoxins killed the embryo, or the corpus luteum formation was hindered by the frequent bursting of graafian follicles superinduced by sexual intemperance, or the mechanical and vascular disturbance loosens the ovum from its bed. Operations come under the head of trauma, but

unless some predisposition exists, usually do not affect the pregnancy. The author has removed fibroids from the pregnant uterus, in one case exposing the chorion, and has amputated the cervix without inciting contractions. On the other hand, a slight operation on a distant organ may result in miscarriage. Ovarian tumors have repeatedly been extirpated safely (66 per cent of cases), as have also breast and other tumors. It is usually the shock and sepsis which bring on the abortion. Appendicitis cases are especially prone, probably because of the infection. Removal of both ovaries during pregnancy has brought out the fact that they are not needed for labor, because the pregnancy and parturition have so often proceeded naturally. It seems that double ovariotomy in the early months is more dangerous to gestation than later, and the fact is explained on the theory that the secretion of the corpus luteum is necessary for the growth of the ovum and uterus."

Carl Henry Davis states that abortion at times may be associated with a severe physical or nervous shock. It occasionally follows grief or fright. In such cases the abortion material should be examined microscopically, since abnormalities usually can be demonstrated.

Trauma is frequently mentioned as the cause of abortion, and to the lay mind, especially, it is believed to play a very definite role. While even slight damage of the abdominal wall, or moderate exertion, as in falling or lifting, external injury, or excessive coition, or even manual manipulation may occasionally provoke abortion, personally we cannot recall a single case that could be ascribed to violence thus inflicted.

In some patients pelvic operation, and even intrauterine manipulation, unless infection follows, may fail utterly in interrupting pregnancy. We have repeatedly removed ovarian cysts, and even tumors from the uterine wall itself, without disturbing the pregnancy.

Severe violence may sometimes be influential, but as a cause it cannot be classed as frequent, except, probably, in patients who are especially prone to abort. Abortion following accidental violence does not result from damage to the uterus, but from rupture of the chorionic sac, or from hemorrhage following partial detachment of the ovum from the uterine wall.

Premature delivery or precipitate delivery produced by trauma is exceedingly rare. DeLee makes little reference to the effect of trauma on premature labor, but apparently regards it as he does its effect on abortion. No reference is made in the other text-books or they view its effect as similar to that of trauma to abortion.

CONCLUSIONS

(1) A careful history, a complete physical examination, all necessary laboratory aids, including Wassermann and thorough pelvic examination, are essential before arriving at a final conclusion as to the cause of abortion, premature delivery or uterine bleeding.

(2) In abortion cases the products of conception, if obtainable, should be examined microscopically.

(3) Abortion and premature delivery may occur following trauma. It is an exceedingly rare sequela and in those cases in which it does occur the majority will show some abnormality in the fetus or membranes.

(4) Uterine bleeding following trauma is exceedingly rare and should it occur a biopsy is indicated.

DISCUSSION (*Abstract*)

Dr. F. Webb Griffith, Asheville, N. C.—There is no doubt that many times trauma is the direct cause of abortion, but by no means as often as is generally considered. Merely the fact that there is an accident, and shortly afterwards a termination of pregnancy, does not prove that an etiological relation exists. That, however, is very hard to prove to a jury.

I recently examined and operated upon a patient for uterine bleeding which started shortly after an automobile accident. It was necessary to do a hysterectomy because of the pathologic condition found in the uterus. It is probable that the accident did start a little bleeding, but the real cause was the underlying disease. The patient brought suit, stating that the accident brought on a hemorrhage, which necessitated a rather severe abdominal operation. The defense claims that while the accident should not have occurred, yet it really did the patient a great service by causing some bleeding, which attracted her attention and that of her physician, and that the operation brought relief; and if it had not been for the accident the disease might have progressed to the stage where surgery might not have sufficed for a cure.

Dr. J. A. Watts, San Antonio, Tex.—After thirty years of experience in traumatic surgery I am of the opinion that abortion or menstrual disorders are coincident to and not the result of injury. The frequency of this condition following trivial accidents and rarity in severe injuries is quite marked. Records will show that where the injured fall into competent, conscientious medical hands, these occurrences are practically nil, while where there is intervention of designing individuals a surprising frequency of them occurs. Gynecological and obstetrical complications do occur, but only when a pathological condition exists.

The difficulty and failure encountered in attempts to terminate a normal pregnancy which is undesired are too well-known to need discussion.

The factors to my mind necessary to cause abortions or menstrual disturbances are preexisting conditions in the individual, a trivial accident and improper handling.

LID CONTROL SUTURES IN THE INTRACAPSULAR OPERATION FOR SENILE CATARACT*

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Unfortunately, the wide divergence of opinion which exists among surgeons of mature experience as to the relative merits of the capsulotomy and intracapsular methods of cataract extraction has led to discussions which, at times, have bordered on the acrimonious. While there are many sound arguments pro and con, it cannot be denied by the opponents of the intracapsular that the ideal to be striven for in any cataract operation is the complete removal of the capsule, cortex and nucleus; provided, of course, that this can be accomplished in such a manner as to insure the maximum operative and postoperative safety to the eye.

Intracapsular operations are of four types: in the first type, the lens is expelled by direct pressure on it and on the contents of the globe. In the second, an instrument is introduced into the eye, which, acting like a scoop, extracts the lens in its capsule. In the third the zonule is ruptured by traction on the lens capsule. In the last the lens is extracted by a combination of two or more of these procedures.

In any form of cataract operation, whether it be capsulotomy or intracapsular, the chief complications which may arise, either at the time of operation or in the healing process, are loss of vitreous and iritis. The specter of the former and the relative infrequency of the latter are at once the vice and virtue of the intracapsular operation. To say that liability to vitreous loss is no greater in any form of the intracapsular than in the capsulotomy operation is absurd, but it is also unfair to say that all types of intracapsular operations are equally liable to this unfortunate complication. However, no matter what technic is used, the very nature of the structures involved renders the eye more liable to the accident. The support which the posterior capsule and the zonule attachment give to the vitreous in the capsulotomy operation is definite and real and, of course, is lacking when these structures are removed.

When judging any operative technic from the standpoint of vitreous loss it seems to me that it is essential to differentiate sharply between prolapse of this body as the direct result of the manipulation in effecting the delivery of the lens, and that which occurs either before or after this has been accomplished, due either to the action of the extra-ocular muscles, the orbicularis, or both. All forms of intracapsular delivery may be accomplished by vitreous loss due to uncontrollable muscular action, but when one is considering this accident as the result of direct manipulation of the eye itself, certainly it is far more frequently encountered in the type of extraction due to pressure alone than it is where traction and pressure are used synchronously.

There are three preliminary procedures employed in practically all intra-ocular operations which should be mentioned at this time. They have reduced immeasurably the risk attendant upon the extraction of a cataract either by the intracapsular or extracapsular method.

I have reference to akinesis, deep orbital injections, and the superior rectus suture.

In order to paralyze the orbicularis, Wright advocated the infiltration of the tissue surrounding the main trunk of the facial nerve after it emerged from the stylomastoid foramen. This method never became very popular, chiefly because of the difficulty in reaching the nerve and because of the facial palsy which ensued.

The method suggested by O'Brien, of infiltrating the tissues surrounding the temperofacial branch of the seventh nerve as it crosses the condyle of the inferior maxilla, is used by many surgeons and has much to recommend it.

Finally, the area immediately surrounding the orbicularis may be infiltrated as suggested by Van Lint. This is the method, slightly modified, which I use.

A 40 mm. platino-iridium needle is used to make the injection at a point 2.5 cm. external to the external canthus. Six c. c. of 2 per cent procaine solution, to which epinephrine has been added in the proportion of 1-15,000, are used in effecting akinesis. The needle should be thrust down to the periosteum before any of the solution is injected, as the terminal fibres of this nerve lie very close to the bone at this point. It is then directed along the inferior margin of the orbit, injecting 2 c. c. of the solution as it advances. The needle is partially withdrawn and more of the solution is injected in the same manner along the superior margin of the orbit.

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With a smaller and finer needle the upper and lower lids are infiltrated to make the insertion of the lid sutures painless. Finally, a small amount of the solution is injected along the side of the nose above the inner canthus. This anesthetizes the skin of this region and prevents any sudden movement of the patient should the point of the cataract knife prick the skin during the forward thrust.

Anyone who has seen the flaccid condition of the lids so injected can appreciate the fact that at least one source of danger has been eliminated.

However, vitreous prolapse due to movements of the eye and to the normal tonus of the extra-ocular muscle, is difficult to eliminate and cannot be attributed to any contraction of the orbicularis.

Twenty-five years' experience in ophthalmic surgery has convinced me that 90 per cent of the complications which arise during operations on the eye are due to pain, and that if this is eliminated there is a much greater chance of completing them satisfactorily.

Retrobulbar injections of procaine solution are used by most ophthalmic surgeons, and this part of the technic certainly merits the popularity which it enjoys.

If I were obliged to discard all of the measures which we use to safeguard the integrity of the eye in intra-ocular surgery save one, I would unhesitatingly retain retrobulbar injections. It not only makes the iridotomy or iridectomy absolutely painless, but prevents any involuntary movement of the patient should the iris be cut when the incision is being made. Furthermore, there is no pain when the lens is passing through the pupil. At this critical stage of the operation it is imperative that the operator shall have complete control of the situation. He most certainly cannot have this if the maneuver is painful.

I use 2 c. c. of 4 per cent procaine solution to which has been added 2 drops of 1-1,000 epinephrine solution immediately before the injection is given.

The needle, which is of platino-iridium 40 mm. long, is brought to a cherry red by passage through an alcohol flame, enters the orbit through the skin at the lower orbital margin about 1 cm. down, and to the nasal side of the external cantha ligament. The point of the needle follows the lower external wall of the orbit for its entire length. Before injecting any fluid the plunger is withdrawn so that one may be sure that the needle has not entered a vein. By manipulating the syringe the tip of the needle is directed beneath the lower border of the external rectus muscle close to the globe so that the maximum amount of the solution shall infiltrate the region of the ciliary ganglion and nerves.

After the needle is withdrawn a cotton or gauze compress is placed on the closed lids and slight pressure is made to prevent any proptosis which might ensue. Fortunately, I have never had to meet this complication and it is not likely to occur if only 2 c. c. of solution are used.

This injection follows the lid injections immediately and usually there is an interval of from five to eight minutes before the incision is made.

Two by-products of the retrobulbar injections are slight hypotony and paresis of the inferior rectus muscle. I consider them advantages because the former reduces the liability of undue bulging of the wound, and possible vitreous prolapse, and the latter prevents sudden looking down during the operation.

In order to facilitate the placing of the superior rectus suture the assistant forcibly rotates the eyeball downward, and the tendon of the muscle is grasped with a very sharp mouse tooth forceps immediately behind the insertion. It is important that the tendon itself shall be grasped by the forceps, as well as the overlying conjunctiva and capsule. If the latter only are included in the suture the control of the movements of the eye will be ineffectual. The closed forceps, therefore, should be placed lightly over the insertion of the tendon and the conjunctiva and capsule pushed to either side. The forceps are opened the required amount, then closed over the tendon by making substantial pressure toward the center of the globe, and the suture is inserted.

Following the suggestion of my associate, Dr. Dickey, a small amount of a 3 per cent solution of epinephrine bitartrate is applied to the region below the cornea from 4 until 8 o'clock in order to effect a localized dilatation of the pupil at this point. A small cotton pledget saturated with a few drops of the solution may be applied at this point, or the areas wiped with the solution carried on a cotton wound applicator. Applied in this manner it is just as effective as a subconjuntival injection of a weaker solution, and has the added advantage that it does not

balloon the conjunctiva and interfere with fixation. The application should be made about five minutes before the eye is incised.

The next step is to dissect from above the cornea a small triangular flap consisting of conjunctiva and underlying tissue. This is undermined down to the limbus. No. 1 black silk suture threaded on a No. 6 Gruss needle is passed through the tip of the flap and then through the conjunctiva above. The free end of the suture and a portion of the loop are laid over the cornea and are subsequently used by the assistant to raise the corneal flap when the incision is made, the iridotomy is performed and the operator inserts the capsule forceps.

The three points upon which I should like to lay particular stress in this paper are the lid control sutures, the combined capsule forceps and needle, and, finally, the manner in which the lens is dislocated and delivered.

Several years ago I discarded specula, lid hooks and retractors in favor of multiple sutures for controlling the lids in cataract extractions, and in all the intra-ocular operations in which it is necessary or desirable to raise the lids from the globe in order to enlarge the operative field or make it more accessible.

With good akinesis the flaccid lower lid offers no problem. In many cases it makes no pressure on the glove and may be pushed out of the way with the fixation forceps. However, it is better to insert a double suture in the middle of the lid. The two free ends are clamped with a light mosquito forceps, the weight of which is usually sufficient to evert the lid, or it may be held by an assistant.

The control of the upper lid is not quite so simple, and much depends upon the manner in which the sutures are placed and manipulated.

The double sutures must be used; neither one nor two will do. The reason for this I shall explain later. The middle of the upper lid is grasped with a light dressing forceps, one blade on the conjunctiva and one on the skin surface. A curved needle carrying about eight inches of No. 3 white twisted silk is inserted 3 mm. from the lid border in such a way as to include in its bite skin, muscle and pretarsal fascia, and, if possible, a portion of the tarsal plate. If the needle should emerge on the conjunctival surface no harm would be done, but it is not necessary for it to do so to secure adequate control of the lid.

Two more sutures are inserted, one midway between the first and the external canthus, and the other midway between the first and the internal canthus.

The six sutures are then arranged in such a way that they shall be parallel to one another, and they are held in place by a special forceps. While they are still in the operators grasp, before the clamp is finally closed, the two central sutures are drawn up shorter than the lateral ones so as to ensure a curved lid border, the reason for which is obvious. The sutures are clamped about two inches from the lid margin.

If a single suture is used a v-shaped arrangement of the lid is effected, and while this ensures ample space in the center, the two sides of the lid margin in certain eyes have an undesirable tendency to compress the globe. Furthermore, even though it does compress the globe, there is a tendency for the lateral margins of the lid to cover the ends of the incision and interfere with the toilet of the wound.

If two sutures are used the straight edge of the lid between the sutures limits the operative field and also interferes seriously with the toilet of the wound.

It is important that each pair of sutures shall be equidistant from the other when the clamp is finally closed and locked. They should not be bunched, because the ability to manipulate the margin of the lid is then lost.

With the three sutures inserted and held in the clamp, as I have suggested, the assistant can manipulate the nasal and temporal margin of the lid so that the operator shall have free access to any part of the wound and prevent it from touching the globe at any point.

With regard to the control of the upper lid during the several stages of a cataract operation there are two points which I should like to emphasize: first, the position of the lid when the incision and iridotomy are made; and second, that which it is made to assume when the lens is being delivered, and immediately afterwards until the operation is completed.

While the incision is being made it is essential that the operator shall have as much room as possible. This is accomplished by making traction on the lid sutures in a plane at right angles to the optic axis. This position is maintained while the iridotomy is made and until the capsule forceps have been inserted into the anterior chamber and have grasped the capsule of the lens.

As soon as the dislocation and expression of the lens has begun, the forceps controlling the

upper lids sutures is gradually lifted as much as possible. This will usually not exceed 30 degrees from the horizontal while the capsule forceps are in the eye. However, as soon as the lens is delivered the forceps are raised still more so that the axis of traction is almost coincident with the optic axis.

The advantage of the triple lid sutures is that the assistant is able to raise or lower the lid any required amount to meet contingencies as they may arise. Except in those cases which have prominent eyeballs, the conjunctival suture is usually tied under the partially-lowered lid.

The reposition of the iris and the adjustment of the conjunctival flap are effected from either side, also beneath a partially-lowered lid.

The question may be asked whether there is a tendency to lid eversion when traction on the suture is made. I have had two cases in which this did occur when traction was made at right angles to the optic axis, but never except in this position. A small Desmarres lid elevator placed under the upper lid will counteract this complication. This should be allowed to remain until the lens is delivered. It may be removed during the toilet of the wound or allowed to remain if everything is going well. However, eversion occurs too infrequently to be considered a serious objection to the use of the triple sutures for controlling the upper lid.

For the past twenty years, with the exception of an interlude of three, during which I used the Barraquer operation of vacuum fixation, I have used a technic modified after that which was first described by Torok and afterward practiced by Elschnig.

In the Stanculean-Knapp operation the lens is dislocated with a blunt forceps. After the zonule fibres have been ruptured the forceps are withdrawn and the lens in its capsule is expressed as in the extracapsular operation.

In the Torok-Elschnig operation the capsule is grasped as low down as possible and by a side-to-side, up-and-down motion the zonule fibres are broken. Instead of releasing the capsule it is retained in the grasp of the forceps and pressure is made on the eyeball below the limbus in such a manner that the lens is tumbled; that is, it rotates around a horizontal axis so that the lower edge is delivered first.

The technic which I now use was inspired by a paper by Smith[5] in which he described a method that he has developed whereby he deliberately tumbles all types of lenses by utilizinig the vitreous to effect the rupture of the zonule.

In his original method for tumbling the lens the tip of the expression hook was placed over the lower portion of the cornea and pressure was made in such a way that the tip rested against the ciliary ridge. After this occurred traction was made toward the patient's feet, thereby permitting the vitreous body to force its way between the ciliary ridge and the lower edge of the lens and break the zonule at this point. He found, however, that this was not applicable to all types of cataract. He abandoned this method and instead places a spoon over the wound so as to support the upper half of the lens and the underlying vitreous. The expression hook is then laid flat on the sclera with the knee toward the cul-de-sac and the tip resting on the globe well below the limbus. By making pressure with the entire hook the vitreous is forced between the ciliary ridge and the equator of the lens, the zonule is ruptured and the underlying vitreous revolves the lens around the horizontal axis. The pressure of the spoon above holds the upper half of the lens in position and facilitates the revolution.

The part of this technic which I have adopted is that in which the vitreous is used to break the zonule fibres. However, instead of using the spoon to make the counter pressure over the wound, it seemed to me that if the capsule were grasped in the pupillary area and not near the lower margin of the pupil it would afford the necessary counter pressure against which the lower half of the lens could be made to revolve in its delivery.

It is important that only a very small bite of the capsule be taken by the forceps so as to avoid stretching the capsule and thereby inviting a rupture of this membrane.

Unlike most of the other operations in which a blunt capsule forceps is used, no attempt is made by movements to dislocate the lens at any point. It is held firmly but lightly in the position which I have just described until after the lower portion of the lens is dislocated. This is the maneuver borrowed from Smith's technic, which takes the place of the spoon or spatula placed over the wound.

Without making any traction on the capsule whatsoever, the tip of the expression hook is placed on the sclera at a point at least 4 mm. from the limbus, and pressure is exerted directly toward the center of the globe for a few sec-

onds. If there is no evidence of the zonule's rupturing opposite this point, which can be detected at once by bulging of the iris, the tip is moved around from side to side, maintaining the same distance from the limbus. This maneuver might be called feeling for a weak spot in the zonule.

In not a few cases one will encounter lenses in which the zonule does rupture at one side or the other of the vertical meridian.

The moment that the operator is sure that the zonule has ruptured the pressure on the globe is relaxed and for the first time slight traction on the forceps is exerted.

As the delivery progresses the tip of the expression hook follows the emerging lens and gradually folds the lower portion of the cornea behind it, maintaining this membrane against the lens. If the lens is hard, with very little soft cortical material, the operator can see a very definite revolution of the lens around the horizontal axis. Many times, however, a lens with much soft cortex will actually mold itself in delivery and hang suspended on the forceps without any visible tumbling.

In order to convey in a few words the various steps in the delivery of the lens let me segregate them as follows:

Fixation of the lens with the capsule forceps, with no traction; pressure on the globe, with the tip of the expression hook four or five mm. below the limbus in the vertical meridian, a sliding motion, with pressure to either side concentric with the limbus; pressure of vitreous against the back of the lower half of the lens and between the equator and the ciliary ridge. As the lens begins to show evidence of dislocation begin traction and release scleral pressure, as the movement progresses more traction and a sliding upward of the tip of the expression hook to tuck the cornea behind the lens as it passes between the lips of the wound.

Occasionally, just as the lens is about to be delivered and the cornea has been tucked against its posterior surface it refuses to budge any further. It lies half in and half out of the wound, with the lower edge pointing toward the operator. The body of the lens lies between the scleral lip above and the tip of the expression hook below, with the cornea between it and the lens.

The capsule forceps may retain its hold on the unruptured capsule, or it may have torn this membrane, and despite the fact that the cornea is tucked behind the lens, it refuses to budge. There are times when this complication presents itself when the lens is not out of the wound far enough to permit of rotation by the concavity of the expression hook. To meet this emergency I devised the combined needle and capsule forceps. Without releasing the pressure with the point of the expression hook, I hold the lens in position, reverse the capsule forceps, transfix the lens with the needle, and gently rotate it out of the wound.

As soon as the lens is delivered the conjunctival suture is tied. In the event that the capsule has ruptured as the lens is delivered, capsule tags which remain between the lips of the wound are very gently withdrawn with fine forceps.

The iris is replaced by passing the spatula beneath the closed wound from either side, and the conjunctiva is replaced. One per cent eserine and White's ointment are placed in the lower cul-de-sac, and the lids are closed. Both eyes are covered with light pads held in place by adhesive strips, and the eye which has been operated upon is covered with a Fox aluminum shield.

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VITAMIN THERAPY*

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During all the early work on the metabolism of foods, it was assumed that a diet consisting of proteins, fats, carbohydrates, minerals and water in sufficient quantity to supply the needs for fuel and growth was adequate for all conditions of nutrition. One of the early investigators of food values, Carl Voit, suggested feeding pure food stuffs, in the study of relative dietary values. This was undertaken by various investigators, always without success. For example, milk was considered to contain all the primary food elements, but when each was isolated and fed in pure form the supply was inadequate for fuel and growth. However, the addition of certain natural foods to such inadequate rations

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was effective in promoting normal nutrition. It, therefore, became apparent that substances other than the primary food elements were indispensable. These "accessory foods" were finally designated "vitamins," from the Latin word *vita*—meaning life, and the chemical word amine, meaning nitrogenous. It was later learned that not all vitamins were nitrogenous, and the *e* was dropped. The ending *in* is in line with other chemical terms, and is noncommittal as to the chemical nature of the substances.

The vitamins were first grouped according to certain physical properties, as fat-soluble and water-soluble. Later, when some knowledge of their physiological action was developed, they were grouped as anti-ophthalmic, antineuritic, antiscorbutic, antirachitic, and so on. More recently the vitamin related to growth and ophthalmia is called vitamin A; to beriberi or polyneuritis, vitamin B; to scurvy, vitamin C; to rickets, vitamin D; to gestation, vitamin E; and the debatable one, pellagra, vitamin G.

Unfortunately, vitamins have not as yet reached the stage where they can be prescribed in pure form with definite recommendations of dosage and definite therapeutic indications, except possibly vitamin C or ascorbic acid, carotene, the provitamin A, and cod liver oil with its concentrates being the next nearest approach. We, therefore, have to depend largely on a dietary regime in vitamin therapy. Very shortly, up-to-date tables on food values will not only give caloric values, but vitamin units per gram of each food.

Vitamin A has been isolated in almost pure form. It has also been synthesized in almost pure form. A substance called carotene, derived from plant pigment, and closely related to vitamin A, has been isolated in pure form. It is considered not to be vitamin A itself, but is converted into vitamin A in the body. In other words, carotene in plant life is considered the precursor of, or provitamin of, vitamin A in the animal. The vitamin A potency of carotene has led to the adoption at a recent meeting of the International Conference on Vitamin Standardization, held in London, of recommendation that pure beta-carotene of melting point 184°C., and optically inactive, be used as the international standard of vitamin A, 0.6 micrograms representing one unit. As a substandard, a sample of cod liver oil, the potency of which in international units has been well established, is recommended.

Vitamin A has little color, it absorbs light wave lengths of 28 millimicrons, shows an absorption band of 619 millimicrons, and gives a blue color with antimony trichloride. It is considered a primary alcohol derivative of one-half of the carotene molecule, carotene being a crystallizable hydrocarbon with a cyclic structure related to the terpenes. It is fat-soluble and quite easily destroyed at high temperature in the presence of air, but high temperature in the absence of air does not seem to be injurious. Low temperature adds to its stability. It is damaged somewhat by exposure to light.

The animal is dependent on exogenous sources for its supply of vitamin A. The best foods are pigmented vegetables, those that grow above and below the ground, butter (the more yellow the better), cream, milk, cheese, cod liver oil, eggs, liver, and whole wheat bread.

We have a rather limited knowledge of the function of vitamin A. We are only familiar to some extent with the dire consequences of a deprivation of this accessory food. Among the outstanding signs and symptoms that "all is not going well within" are lack of growth, night blindness, a characteristic ophthalmia, referred to as keratomalacia and xerophthalmia, and a general lack of vitality of the epithelial structure of the body. Urinary calculi are said to be almost as characteristic of vitamin A deficiency as xerophthalmia, and a definite type of dermatitis, consisting of dryness, itching, folliculitis and acneform eruption, has been reported. The skin lesion is in the epithelium, resulting in hyperkaratosis of the epidermis and hair follicles. There is no inflammatory change, except secondarily, and no hemorrhage. Experimentally, animals show lack of ovulation, even on slightly low vitamin A diet.

Jeans and Zentmire have worked out a clinical method of determining moderate degrees of vitamin A deficiency with the electrically illuminated Birch-Hirschfeld photometer. This test determines the sensitivity to light following partial dark adaptation.

For vitamin A therapy one must depend on dietotherapy and chiefly cod liver oil or other fish liver oils and their concentrates. The Council on Pharmacy and Chemistry advises one teaspoonful of standard cod liver oil three times a day for infants and twice that amount for adults. To be standard, each gram of cod liver oil must contain not less than 600 units of vitamin A and 85 units of vitamin D. The concentrates must contain not less than 14,000 units of vitamin A and 1,400 units of vitamin D per

gram. If for any reason cod liver oil cannot be given by mouth, it can be given hypodermically (sterilized by boiling) in 0.5 to 1 c. c. doses subcutaneously daily, with excellent results and no untoward effects.

The situation in regard to vitamin B is more complicated, due to the complex nature of vitamin B. It is made up of several factors which are known as vitamins B_1, B_2, B_3 and B_4. The evidence for the existence of B_1 and B_2 (G) is quite conclusive, but the question of the existence of B_3 and B_4 is still debatable.

Vitamin B_1 has been repeatedly reported isolated in crystalline form, but only in milligram quantities and probably then not in pure form. Its cost of preparation in crystalline form is prohibitive. Vitamin B_1 is soluble in water and in alcohol of concentrations of 83 to 93 per cent by weight. The resistance of vitamin B_1 to heat in faintly acid medium is considerable, the extent depending on the temperature, time and conditions of exposure. There is little or no destruction when it is heated for 30 minutes at 100° C. However, it is rapidly destroyed in the presence of alkalies, even at low temperature.

Sources for vitamin B_1 therapy must be mainly dietary. Yeast and wheat germ are two excellent sources; whole grain cereals, egg yolk, liver, kidney, brain, tomatoes, raw cabbage, fresh spinach, and legumes are also good sources. There are numerous special concentrates on the market, made mostly from yeast, rice polishings, and wheat germ.

The International Committee on Vitamin Standardization met recently in London and recommended the continuance of the previously adopted standard for vitamin B_1 of the adsorbate on acid clay.

The outstanding condition resulting from a vitamin B_1 deficiency is beri beri or polyneuritis; however, data is rapidly accumulating which suggest a multitude of other disturbances associated with B_1 avitaminosis. For example, it is said to retard growth, to cause loss in weight, to impair the digestive tract, decrease reproductive power, increase nervousness, cause loss of appetite and degeneration in the nervous system. Cases of ophthalmia similar to that seen in vitamin A deficiency have been reported. The polyneuritis of pregnancy is in some cases probably a vitamin B_1 deficiency. Glossitis, atrophy of the lingual papillae, and achlorhydria gastrica have been produced experimentally with vitamin B_1 deficient diets. Whether achlorhydria gastrica is sometimes caused by a vitamin B_1 deficiency diet, or since vitamin B_1 is readily destroyed in an alkaline media, one must wonder if achlorhydria gastrica does not inhibit the function of vitamin B_1. What part this may play in the production of beriberi, pernicious anemia, and pellagra, is impossible to say at present.

Vitamin B_1 is apparently most needed during lactation, growth and development. We have no specific test for a deficiency and have to rely on symptoms and signs of the above mentioned disorders, and dietotherapy must be resorted to until we have a marketable product isolated.

Vitamin B_2, the designation used by the English writers, is the same as vitamin G, the term employed by American writers to represent the supposed antipellagric vitamin. It is the thermostable factor of the vitamin B complex. B_2 or G is very stable to most temperatures and conditions. It will keep its identity where vitamin B_1 breaks down. In fact, this is the method of eliminating B_1 from a basal experimental diet. B_2 (G) is less stable in alkaline media than in acid. It is water-soluble. Chemically, the flavines are closely related to vitamin G. Ovoflavine from eggs and lactoflavine from milk have been isolated in almost pure form and are the most potent preparations of vitamin G yet discovered.

Vitamin G is well distributed in food materials. It is especially plentiful in dried or autoclaved yeast, milk, egg yolk, whole grain bread, and cereals, the leafy vegetables, carrots and potatoes, lean meats and organs, especially liver.

In vitamin G deficiency numerous pathological conditions are reported, pellagra and retarded growth being the outstanding conditions usually accredited to it. Data has accumulated pro and con on this subject. It, at least, causes a pellagra-like dermatitis in rats which can be cured by addition of vitamin G to the diet. The contention that it retards growth seems well established. Also there are usually reported loss of appetite, dermatitis, increased skin pigmentation, stomatitis and diarrhea. It also leads to ophthalmia, with cataract formation which can be arrested by addition of vitamin G to the diet.

It seems that vitamin G, so far as it plays a role in the syndrome of pellagra, may be of far more value as a prophylactic measure than as a curative agent. This is borne out experimentally as the early signs of pellagra, or pellagra-like conditions can be easily cured by addition of vitamin G to the diet, whereas, if allowed

to go on to advanced stages, the animal almost always dies in spite of vitamin G therapy. This may be due to certain pathological changes that inhibit vitamin G therapy or make it ineffective.

As in B_1 deficiency one must depend on dietotherapy. A short list of richest sources was given above.

Vitamin C.—This vitamin, which has a definite crystalline form, is recognized as the antiscorbutic factor. When first isolated it was called ascorbic acid, and it is so designated by most European workers now. The Council of Pharmacy and Chemistry have coined the name cevitaminic acid. This vitamin was first isolated from the adrenal cortex, but the worker did not know until much later that the crystalline fraction had the vitamin C properties. It was later found in lemon juice. It has now been prepared synthetically.

Vitamin C is quite stable to heat in acid media, but unstable in alkaline solution. It is water-soluble. Exposure to air and high temperature in presence of oxygen is very destructive to vitamin C. Certain metal containers also impair its potency, especially copper and tin, while nickel, chromium, aluminum and glass are harmless.

Vitamin C has been called the vitamin of uncooked foods. The three richest and most readily available sources are lemon juice, orange juice and tomatoes. It is also found in milk, though it varies considerably with the diet of the cow, seasons of the year, and whether the milk is raw or pasteurized. The green leafy vegetables eaten raw, such as lettuce and cabbage, are good sources, as are potatoes, carrots, green peas and string beans, if not cooked too long and if exposed as little as possible to the air while cooking.

Vitamin C deficiency not only leads to scurvy, but also to many related disorders, such as hemorrhage into the skin and joints, joint disease strikingly similar to acute rheumatic fever, increased susceptibility to infection, increased fragility of blood vessels, vagus nerve disturbance as evidenced by increased pulse and respiratory rate; also sensory nerve disorders, such as paresthesias of several forms. Metabolic disturbances are also reported, particularly in regard to an unstable suprarenal gland function, with increased skin pigmentation as seen in Addison's disease. Dental caries and skeletal fragility are outstanding among the pathological changes noted.

A clinical test for vitamin C deficiency has been worked out. A sphygmomanometer at pressure of 35 to 50 mm. is applied and the number of petechiae are noted which appear in a marked-off area 60 mm. square below the cuff on the inside surface of the arm below the elbow. This pressure is maintained for 15 minutes. If more than one petechia appears at 35 mm. pressure, or more than 8 at 50 mm. pressure, it is considered indicative of vitamin C deficiency. This test, of course, depends on capillary fragility.

Therapeutically, 1 mg. of ascorbic acid a day is said to protect against scurvy. However, it is advised that we have a minimum of 20 mg. This can be accomplished by the daily intake of 30 c. c. of orange juice, which has a potency of 20 mg. of ascorbic acid.

Ascorbic acid is so far not available for use in prescriptions, and we must still use dietary measures therapeutically. However, sterilized, filtered citrus fruit juice neutralized with sodium hydroxide can be given intravenously when indicated, with prompt results.

Vitamin D is called the antirachitic vitamin, the sunshine vitamin or the calcium-phosphate metabolizing vitamin. All efforts to prepare vitamin D in a pure state and to determine its physical and chemical properties have so far met with failure. However, by irradiating ergosterol, which is a definite chemical body, found particularly in ergot and yeast, one can bring about a chemical change and partial conversion into vitamin D. Ergosterol may be regarded as a provitamin D. The end product of ergosterol irradiation is called in this country viosterol; in England it is called calciferol.

Vitamin D is remarkably stable to heat and oxygen. A temperature of 180° C. or higher will, however, destroy it. It is fat-soluble. It is not injured by slightly acid or alkaline media.

Vitamin D is the most essential simple dietary factor in connection with the development of rickets. In vitamin D deficiency we find in addition to rickets other pathological conditions such as disturbed blood calcium and phosphorus, tetany, dental caries and irregularity in size, shape and position of the teeth, osteoporosis, osteomalacia and celiac disease. It is especially needed during the period of growth, during pregnancy and during lactation, also in acute and chronic infections and wasting diseases. There are at least five reliable and well established antirachitics. The first to be established was cod liver oil; the second was direct irradiation of the body by means of ultraviolet energy; the third was irradiated food, particularly milk; the

fourth, an irradiated substance, ergosterol, extracted from yeast; the fifth, "yeast milk," produced by feeding cows irradiated yeast. In addition to these there are numerous variations, modifications, and combinations of the above. The choice of antirachitics depends on their availability, cost, popularity, palatability, and so on. Irradiated milk seems to be the most desirable antirachitic for therapy on a large scale. Only 20 to 24 ounces daily are needed to assure protection. This therapeutic agent is inexpensive, palatable and provides calcium and phosphorus, as well as other primary food elements.

Various companies supply cod liver oil or haliver oil and their concentrates with marked variation in potency. There is no established close demarcation of dosage; however, it is generally estimated that a dosage of 1,500 international units a day is needed for prophylaxis and 3,000 to 5,000 a day for curative treatment. The International Conference which recently met in London recommended that the old standard of viosterol in olive oil be continued as the standard for the vitamin D unit.

Although other fish oils have proven to be as rich in vitamin D as cod liver oil, or even richer, still the latter remains the most important natural source of the vitamin. Egg yolk is sufficiently high in vitamin D to prevent and cure rickets. Milk, cream and butter are very poor in vitamin D, as are all vegetables. Cereals seem to have a substance which inhibits the action of vitamin D, at least a definite anticalcifying substance. Although sunshine seems to be beneficial by its action on ergosterol deposited in the skin, it is undependable on account of our lack of exposure to it. For example, clothing, window glass, smoke, dust, fog, and so on, destroy the effect of sunshine.

In discussing this vitamin, something should be said of the possibility of a hypervitaminosis. In fact, it would seem logical to assume that substances like the vitamins that are active in fractions of milligram doses would be harmful in hypertherapeutic doses. It is known that vitamin D is not devoid of toxicity. However, except in cases of hypersensitiveness, one can give 50 to 100 times the minimum dose with impunity. Vitamin D is made more toxic when a large amount of calcium is given with it. Experimentally, D hypervitaminosis produces increased calcification of the tissues, particularly the cardiovascular system. It also causes loss of appetite, loss of weight, diarrhea, cachexia, and disturbance in fat and calcium metabolism.

It is believed that hypervitaminosis of A, B, C and D increases one's tendency to malignancy, and if malignant tumors are present, makes them grow more rapidly. Cases of severe eczematous eruptions in children have been reported due to super-therapeutic doses of viosterol. It is at least well to remember that feeding vitamin D to a non-rachitic individual is not without danger.

Vitamin E, about which very little is known, is fat-soluble, highly stable to heat, acids and alkalies. It is supposed to be essential to fertility of the male and female animal. It has not been proven connected with any disease in man. However, in animal experimentation there is not only impairment of reproduction, but disturbance in growth, muscular atrophy, nervous impairment, and low general state of health.

Vitamin E is abundant in green leaves of certain plants and seeds. It is found especially in lettuce, spinach, alfalfa, water cress and wheat germ.

Since such vitamin deficiency disturbances as xerophthalmia, beriberi, scurvy and rickets are universally recognized and their etiological and therapeutic phases determined, it is worth our while to give greater attention to latent or subclinical avitaminosis. None of the outspoken deficiency diseases are full-blown overnight. A series of insidious manifestations present themselves long before the typical picture of the end stage is seen. The vitamin deficient diet will often produce countless vague symptoms, and poorly defined signs that go unrecognized, while the patient is classified perhaps as representing one of the minor neuroses, and is given psychotherapy when he needs dietotherapy.

It is especially important in obese patients and other patients who are on a limited or restricted diet that we see to it that the vitamin aspect of the diet is taken care of. If we neglect this we will very probably exchange the thing we are treating for a vitamin deficiency disease.

It is well to remember the interrelationship of the vitamins. All are factors in growth; apparently more than one plays a part in skin diseases, sex development and gestation, lack of tissue resistance to infection, nerve changes, and a host of minor disorders. Furthermore, A and B apparently act more readily in the presence of each other and B is said to be capable of mitigating the evil effects of an excess or deficiency of vitamin A.

Disease caused by vitamin deficiency may result from: (1) reduction of adequate intake of

vitamin; (2) deficient absorption and storage; (3) altered metabolism of the vitamin in the body; and (4) increased demand for and consumption of the vitamin under special physiological and pathological conditions. It is the clinician's duty to detect and classify these conditions before structural changes occur. If we wait to recognize a vitamin deficiency until vision is lost, or paralysis has occurred, the teeth are gone, a rachitic deformity is present, gestation has failed, or possibly pellagra has developed, then we have lost valuable time in the treatment of our patient.

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SUGAR METABOLISM: ITS SYMPTOMATIC RELATION TO NEUROLOGIC AND PSYCHIATRIC DISORDERS*

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In scanning the literature one frequently finds reports of neurologic and psychiatric symptoms due to the abnormal variation of the blood sugar level, usually to hypoglycemia. The many unexpected symptoms accompanying the use of insulin during the early days of its clinical application have not only stimulated investigation of carbohydrate metabolism in the diabetic but also developed the study of biochemistry in relation to the nervous and endocrine systems.

Katzenelboger and Friedman-Buchman[1] in 1933 studied the blood sugar curves in a series of 116 patients having major psychoses, and found a tendency to a characteristic type of curve, predominantly hyperglycemic, in each of the several types of disorder. They concluded the variations are physiological accompaniments of psychobiological reactions. Whitehorn[2] in 1934 published sugar estimations in 958 psychotic patients to determine the relationship between hyperglycemia and strong emotional reactions, with essentially negative results. Of the 484 patients examined above 45 years of age, 27 showed high blood sugars, especially those with arteriosclerosis and senility.

Until 1913 it was believed that high blood sugar concentrations were provocative of toxic bodily symptoms,[3] and the question remained a disputable one for the next 10 years. Albritton[4] and others in experiments on animals and in man[5] have not noted any toxic symptoms in marked hyperglycemia. Evans[6] in 1933 was able to produce a higher blood sugar concentration in rabbits than former investigators without evidence of toxic effects. In one instance the sugar level of 1,900 mg. per 100 c. c. of blood was reached.

We may draw the conclusion that high blood sugar concentrations are not conducive to the production of neurologic and psychotic symptoms. The cerebral accidents which occur in diabetes are reported by Jordan and Watters[7] as being due to arteriosclerosis, hypertension,

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and other cardiovascular diseases. In spite of the above findings, it must be remembered that diseases and injuries to the midbrain may be accompanied by glycosuria and hyperglycemia.

Hypoglycemia and the accompanying symptoms, now too well-known to reiterate, came to light in 1924 when Harris[8] reported his cases of hyperinsulinism. Since then many types of transient and recurring attacks, displaying a variety of neurological symptoms and psychotic behavior, have been attributed to the sudden lowering of the blood sugar.

The complicated, delicate mechanism of carbohydrate metabolism in the light of recent research appears vulnerable to many influences. If one considers the time which passes between the ingestion of complex carbohydrates and its ultimate breaking down, it is not difficult to see how the failure of the other coordinating functions might contribute to hypoglycemia and its resulting symptoms. Improper timing of the sympathetic adrenal-liver glycogen release, the early liberation of insulin, and primary disease of the liver, with a poverty of glycogen, as well as other factors, illustrate the possibilities of a deficient glycemic state.

I am of the belief that some individuals have a fasting sugar level above the average and a higher tolerance curve, as well as a marked instability of the carbohydrate metabolic mechanism; that if the difference between the peak and the end point of the reaction be great and reasonably sudden the patient may react symptomatically, as in true hypoglycemia, at a lower level. Tedstrom[9] has reported symptoms occurring with blood sugar between 80 and 90 mg. per 100 c. c. of blood.

The "precipitation point" is not the same in all patients. Jordan[10] has shown that symptoms may occur at different subnormal levels in the same patient and yet not be precipitated with a blood sugar of 0.02 per cent (his case No. 11222).

Eitel and Loesser[11] recently studied the relationships between carbohydrate metabolism, the liver and the thyropituitary influence in guinea pigs. They found that when the thyrotropic substance of the anterior lobe of the pituitary was injected intraperitoneally, changes took place in the thyroid gland comparable to those of exophthalmic goiter in man and, as a result of the increased thyroid activity the liver glycogen was decreased. After 11 injections of the substance the liver became glycogen-free. When the thyrotropic substance was injected in thyroidectomized animals there was no depletion of liver glycogen.

The question may arise, does the pituitary gland secrete two substances, among others, one acting through the thyroid gland and releasing liver glycogen, and another directly suppressing the insuligenic function of the pancreas?

In addition to releasing the liver glycogen the adrenals may have a direct inhibitory effect upon the insulin output, and the use of adrenalin for the immediate relief of hypoglycemic attacks has been advised by Harris[12] and others.

To the gonad secretion there has also been attributed the function of lowering the blood sugar. Especially is this said to be true of the ovaries. *Cases 2* and *4* of Tedstrom's[9] report had symptoms of hypoglycemic attacks during menstruation, there being sufficient evidence of the relationship for him to continue his investigation.

Furthermore, other physiological factors may be involved. Wortis,[13] and also Holmes, hold that increased insulin output "diminishes the oxygen consumption of the cerebral cortex," and very probably results in anoxemia of the tissues. In referring to convulsions resulting from injected insulin he adds:

> "Since the blood dextrose (the chief brain fuel) and brain lactic acid levels appear to be directly related, that is, the lower the blood sugar the lower the brain lactic acid level (Holmes) it may be possible that the resulting generalized muscular convulsions act as a protective mechanism to add lactic acid, a food utilized by the brain, to the circulating blood medium." (A protective homeostatic mechanism.)

This factor may be applied to *Case 1* of disordered carbohydrate metabolism here reported, especially the probability of anoxemia. The attacks were not only psychotic, but often were accompanied by motor phenomena with definite expenditure of energy and moderate cyanosis.

Since there is an apparent relationship between the cerebral oxygen and sugar level, it seems wise to look further into the metabolic physiology and its influence on human behavior. Ross McFarland[14] in his monograph on "The Psychological Effects of Oxygen Privation on Human Behavior," has discussed the subject admirably, and quotes Barecroft as follows:

> "'Acute oxygen want simulates drunkenness, while chronic anoxemia simulates fatigue.' At high altitudes where oxygen is diminished he has seen well disciplined men become reckless, ill tempered and abusive, burst into tears or sing and shout for joy for no apparent reason, with self-control and sense of fitness of things completely vanished."

Other mental symptoms appear, such as dominating fixed ideas which the individual is bent on carrying out, loss of memory for the event and diminished sense of time. Motor phenomena are increased with rhythmic tremors. When oxygen privation or alcoholic intoxication is increased there is apparently a descending paralysis of the central nervous system. If, however, oxygen is administered just after an intoxicating dose of alcohol is given, no symptoms of intoxication appear. Palthe[15] found that administration of oxygen for 20 minutes every few hours relieved the mental symptoms in delirium tremens, the improvement probably being due to a higher oxygen concentration of the red cells, since Howe "found by microphotographic studies of the cerebral vessels in animals that alcohol produces acute edema and a slowing of the circulation. Robert Loebel[16] in 1926, in his studies of metabolism of brain tissue, was able to show that oxygen consumption is higher in the brain than that of other organs.

Regulatory centers of metabolism have been placed in different parts of the brain with wide variance of opinion as to an exact location. Roussy and Mosinger[17] are of the opinion it is well established that fat, water, and sugar metabolism are influenced by the ganglionic centers of the tuber cinereum, that there is an intimate relationship between the pituitary body and the tuber cinereum. They further believe the vasomotor functions of arteries and capillaries are regulated by its nuclei. In reference to the nuclei of the tuber, Kuntz[18] says:

"The constituent neurons of these nuclei resemble very closely the visceral efferent neurons in the spinal cord and medulla oblongata; consequently they may be classified as autonomic on the basis of their morphological characters."

Wortis and Klenke[16] (1933) repeated the experiments of L. O. Morgan and his workers (1930) on producing convulsions by injecting a solution of mercurichloride in the tuber cinereum and confirmed them, though not all animals had convulsions. No estimation of the blood sugar was made in Wortis' experiments. He thinks it "highly improbable" that there is one "convulsogenic center" in the brain. Further investigation is needed to determine the regulatory influence of the tuber cinereum on blood sugar.

Evidence of cerebral pathology in hypoglycemia from the use of insulin in diabetes has been presented by Terplan[19] and Wohlwill.[20] The former described generalized edema of the brain and cord with severe changes in the ganglion cells, when stained by the Nissl method; there was also regressive ameboid change in the glia. Wohlwill's cases showed diffuse changes, such as degeneration of the ganglion cells with pyknotic nuclei and loss of normal staining reaction. In one of his cases the axis cylinders were markedly swollen and irregular.

In correlating the data presented the writer is making no attempt at explanation of the primary disease, whether it be cerebral, pancreatic, hepatic, or of another related pathologic condition. I am suggesting the probable effect of spontaneous hypoglycemia on the cerebral metabolism as a possible explanation of the resulting variety of neurologic manifestations.

If it be true that increased insulin diminishes the oxygen consumption of the cerebral cortex, it might well be conceived that other parts of the cerebrum may become involved. Since experiments have shown the brain to have a higher oxygen consumption than other tissues, any condition tending to reduce oxygen or its consumption may produce varying degrees of cerebral anoxemia without affecting other tissues of the body. It may, therefore, be assumed that hyperinsulinism results in decreased oxygen consumption and produces at the same time hypoglycemia, which is not a normal relationship between the oxygen and sugar level. In Howe's experiment it was shown that anoxemia, when produced by alcohol, was accompanied by brain cell edema and slowing of the cerebral circulation. It may be that by the same process insulin increase in the presence of abnormal physiological conditions or disease of the carbohydrate regulatory apparatus would cause a swelling of the brain cells, and in this we may have an explanation for the difference in the character of the cerebral symptoms in hypoglycemia. The extent and location of the cerebral edema should be considered in relation to the symptoms presented. With so many factors involved in carbohydrate metabolism there is need of clearer understanding of the coordination between the regulatory centers, the vegetative nervous and endocrine systems.

I am presenting three cases of hypoglycemia,

one with psychotic attacks with motor phenomena, one due to the precipitation of a psychosis by injected insulin and hypoglycemia, and one case of convulsive seizures.

Case 1.—A woman, aged 41, twice married, was admitted seeking relief from morphinism. The addiction arose from the use of the drug during attacks of undiagnosed pain in the lumbar region and doubtful gallbladder disease (negative cholecystogram). The positive findings were a Bell's palsy residuum of seventeen years, hypotonia and general muscular weakness, moderate exophthalmos of the left eye, obesity in all girdles and scant body hair. Blood sugar was 87 mg. and calcium 8.5 mg. per 100 c. c. of blood. Her weight was 177 pounds, height 59½ inches. The patient was otherwise physically negative.

The psychiatric findings were emotional instability, hypersensitiveness, inadequacy and depression over financial worries and an incipient domestic situation.

Seemingly adjusted after one month, the patient was discharged, to be readmitted in three weeks showing emotional symptoms, especially anger tantrums. Violence of speech and action, attacks on nurses and threatened suicide were the most common manifestations. While at home the patient had taken morphine for various pains, and it was necessary again to put her on a drug reduction regimen. The psychotic attacks lasted from a few moments to several hours, the patient afterward claiming to remember nothing of them. Most of these episodes occurred from two and a half to three hours after meals. In view of the fact that she had been placed on a slightly lowered carbohydrate diet for the purpose of reducing her weight it was thought advisable to do a sugar tolerance test which revealed the following:

Folin and Wu method. Glucose 100 gm. given by mouth.

Fasting sugar, 97 mg. per 100 c. c. of blood.

1 hour, 239 mg.

2 hours, 200 mg.

3 hours, 87 mg.

The one and two-hour urine specimens showed strongly positive Benedict's reaction; the third specimen was not obtained.

Another blood sugar estimation before and shortly after breakfast read 93 and 95 mg., respectively.

With no change in diet she was given suprarenal extract, grains 2, before meals with the idea of releasing the liver glycogen, and 10 grams of glucose intravenously two and a half hours after breakfast; 20 grams of glucose was given at the same interval after dinner. Later the caloric value of her diet was increased, with the carbohydrates remaining about the same. The mental symptoms rapidly abated. After several weeks 2 c. c. of whole pituitary liquid were given daily. In the past four months she has had only two mild attacks. Subsequent appendectomy with the normal postoperative use of morphine has not renewed the desire for the drug. Her weight has been gradually reduced from 177 to 145 pounds. This case is probably one of hypoglycemia with psychotic episodes and motor phenomena.

Case 2.—In April, 1932, a married woman, aged 56 years, was admitted with the history of taking a grain and a half of luminal regularly and at times to excess; other drugs and whiskey were used at intervals. She complained of nausea, was dehydrated and weighed 81½ pounds. She had been seen by us ten years previously with symptoms of psychoneurosis. Her blood sugar was 115 mg. per 100 c. c. of blood. The patient had a poor appetite and was given 5 units of insulin three times a day with her meals. Twelve days after her admission she left the hospital and went to a hotel. She rushed up to a woman there and called her crazy and fought the porter who tried to get her away. She was finally returned to her room in quite an exhausted condition, and for two days following this she was in a stupor. A blood sugar taken a few hours after the outburst showed 45 mg. per 100 c. c. of blood. She was given 50 grams of glucose intravenously and the following day her blood sugar had risen to 85 mg. and varied thereafter from this point to 115 mg. She became shut-in and agitated, having occasional psychotic episodes. On forced feeding supplemented by frequent additions of carbohydrates she became moderately communicative and would go for walks and rides, but remained in a mild psychotic state. This case is suggestive of chronic hyperinsulinism with hypoglycemia following the use of insulin, which precipitated an underlying psychosis.

Case 3.—A boy, aged 9, was first seen June 6, 1933, with a history of having had four generalized convulsive seizures in October, 1932. Three occurred in the same day. From May 20 to June 5, 1933, he had four attacks. Six of the eight occurred between five and six o'clock in the morning and two at eleven o'clock. He was incontinent in one, slept after one, was cyanosed in most of them and unconscious in all. The only relevant illness was scarlet fever in June, 1932, from which he slowly recovered. Neurological examination was negative except for a very moderate increase in deep reflexes. There was evidence of sinusitis and nephritis (nonprotein nitrogen 52 mg. per 100 c. c. of blood, albumin and hyaline casts in urine). A temperature of 101 to 102° accompanied each attack. The cause of the seizures was believed to be infectious and treatment was instituted.

From July 14 to September 3 he had four attacks. At the initial examination and at this time a slight increase in globulin had been found and in view of the frequent reports of elevated temperature we became suspicious of a low grade encephalitis. Intravenous glucose, 25 per cent, followed by lumbar puncture drainage, was given at weekly intervals for four weeks, during which period he had eight attacks. He was placed in the hospital for further study. A blood sugar tolerance was begun at 5:00 a. m. (the usual time of his attacks) with the following results:

Folin and Wu method. 70 grams of dextrose given.

5:00 a. m. Fasting blood sugar, 90 mg. per 100 c. c.

6:00 a. m. Blood sugar, 85 mg.

7:00 a. m. Blood sugar, 60 mg.

8:00 a. m. Blood sugar, 75 mg.

Believing that we were dealing with hyperinsulinism, the patient was put on two grains of suprarenal extract morning and evening and given a glass of orange juice

containing sugar at 6:00 a. m. He has not had an attack in thirteen months. In view of the evidence of infection with temperature it was believed that the case was one of encephalitis with hypothalmic involvement resulting in disturbance of carbohydrate metabolism.

It is hoped that the presentation of this subject will stimulate further clinical and experimental investigation.

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DISCUSSION (*Abstract*)

Dr. Masters (*closing*).—It is important to make every informative study at our command on cases having unconscious or convulsive seizures and those who have sudden psychotic attacks when diagnostic neurological signs are absent. Further study should be continued in all phases of metabolic mechanisms, especially carbohydrate variations, oxygen consumption, neurocirculatory apparatus, the endocrine system and the vegetative nervous system and their centers. I do not believe that the necessary information can be obtained regarding the sugar tolerance unless the determinations are carried out over a period of at least six hours, and it is often necessary to repeat sugar tolerance tests, preferably under varying conditions, since this method often reveals the variability of carbohydrate metabolism which could not be otherwise determined. A greater knowledge is needed of the regulatory centers and their pathways.

NUTRITIONAL FAILURE AS A CLINICAL PROBLEM*

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Medicine of the last two decades has been signalized by the recognition that with great frequency disease is caused not by the addition of some hurtful agent but rather by the lack of an essential substance. As has been aptly said, the emphasis today is upon the minus sign. The organs of the body, and the tissues and fluids that make up these organs, are in a wonderfully steady state of equilibrium, so much so that when the organism is deprived of anything essential this balance is profoundly disturbed and entire mechanism upset. To the preservation of this equilibrium, at all times and in the face of all of the vicissitudes to which man is subject, many factors contribute, some of them simple in nature, some exceedingly complex, some large, some exquisitely small.

Nutritive failure in America is seldom complete, and rarely is it the expression of a single nutritive fault; it is more often relative in extent and multiple in nature, and the clinical picture is correspondingly complex. The chief interest that this subject holds for you and me, therefore, is not in the outspoken well defined deficiency diseases which accompany the complete lack of some essential substance, but rather in those vague borderline states of partial nutritive failure, states which often destroy the happiness of the patient and baffle the wits of the physician.

Interest in such borderline states was first aroused several years ago by the description of latent scurvy, given by Hess, a condition that this brilliant investigator believed to be much more prevalent than the outspoken disease. This disorder is accompanied by such vague symptoms as failure of the infant to grow or develop properly, slight pallor, poor appetite and rapid pulse and respiration. The diagnosis becomes clear only with the rapid improvement which follows the administration of the missing factor, in this case antiscorbutic food. Not so well-known is latent beriberi, but Brennan states that this is a frequent disorder in the Philippines. He de-

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scribes five important subjective symptoms: pain in the upper chest, ventral or dorsal; pain or numbness in the legs, easy fatigue, palpitation and insomnia. People so affected do not consider themselves actually ill but, as this author states, the milk of a mother so handicapped would probably be fatal to her infant. In the United States we can place in the same category, I believe, many of the so-called gastro-intestinal invalids who suffer from weakness, vague pains, and all sorts of gastro-intestinal disturbances. Because of a certain mental invalidism such persons are oftentimes afraid to eat, or they are food-faddists who live upon a one-sided diet. Overcome their phobias and force upon them a liberal well balanced ration, with an abundance of what McCollum has termed the protective foods, and it is amazing to see the rapid improvement in their sense of well-being.

Particularly interesting today, when it is stylish to be thin and dietary restriction is extensively practiced, are the skin changes sometimes seen in patients who injudiciously limit their food. An example of this is the peculiar change in the nails, described by White, without subjective symptoms or other evidences of nutritive failure. These changes, varying from slight transverse depression with longitudinal ridging to marked dystrophy, appeared in seven women who had subjected themselves to drastic dietary restriction, and cure in all cases was effected by a more liberal diet in which was included an abundance of vitamins A, B and D. This condition is related, no doubt, to the various dermatoses accompanied by dryness of the skin, itching and acne, which have been observed by other students of nutrition to accompany vitamin A deficiency, and to the peculiar dyskeratosis recently described by Loewenthal. The skin of Loewenthal's cases of vitamin A deficiency showed no evidence of infection or softening; merely changes in the cutaneous epithelium analogous to those which occur in the respiratory mucous membrane; these patients were living upon an obviously deficient diet, and yet, beyond these skin changes and occasional xerophthalmia, they showed no evidences of nutritional failure.

Mere lack of vigor and vague poor health is sometimes the only evidence of a faulty diet. I have been repeatedly impressed by the anemia and lack of a sense of well-being exhibited by young women who, in the effort to remain thin, sometimes grievously thin, have injudiciously restricted their diet. Such borderline states with obscure clinical manifestations are probably more frequent than we think.

Multiple food deficiency expressed itself in a graphic way in the edema seen in Germany during the World War. A similar disorder is being studied today in Tennessee by Youmans, who believes that this edema, like that of wet beriberi and pellagra, is due to the lack of several essential substances, notably protein. I cannot forego mentioning, in connection with Youman's observations, the persisting edema and debility, the result in part of protein starvation, that are often seen in the chronic stages of glomerular nephritis. It is becoming increasingly evident that such multiple deficiency, of which lack of protein is an important feature, is a potent cause of deficiency disease.

The picture is still further obscured in those cases in which the fault is nutritional failure plus other factors. Particularly interesting are the observations of Kolloth and associates which would indicate that beri beri and scurvy have a common underlying metabolic cause and that the influence of the vitamin deficiency is merely a fortuitous one. These workers believe that one or the other disorder, beriberi or scurvy, develops according to the influence of various minor deficiencies or of harmful additions to the diet. Of like import are the observations of Darling, to the effect that among African negroes the same dietary causes scurvy in some and polyneuritis in others. Such observations would lend color to the picture drawn by Mouriquand of what he calls the "invisible dystrophies." Portrayed here are those nutritional disturbances or partial deficiencies which show no recognizable symptoms but which under fortuitous circumstance, a change in environment, perhaps, an accident, a chance disturbance of nutritional equilibrium, or a passing infection, will then become distinct and recognizable. As a typical example this author cites the fact that an animal suffering from lack of vitamin C, but still without symptoms, will suddenly develop typical scurvy when, without change in quality, the quantity of food is increased. He gives examples of similar conditions leading to xerophthalmia, beri beri, pellagra and rickets. Mouriquand, mindful of the fact that such deficiency diseases are not seen in absolute starvation, offers the interesting suggestion that outspoken deficiency

disorders manifest themselves only when the ratio of calories to vitamins is high.

Additional evidence that food deficiency plus some other factor is a potent cause of disease, is seen in the rather startling experiments of Rinehart and Mettier, concerning the response of the guinea pig to lack of vitamin C. In their studies of the muscles, joints and heart valves of guinea pigs suffering from lack of vitamin C, plus an infection, they observed that neither latent scurvy nor infection alone led to the characteristic changes described, but that the two together produced appearances which were strikingly like those of rheumatic fever. They feel that their studies indicate that "latent scurvy prepares the soil or provides the susceptible hosts in whom, with the added insult of acute infection, develop the characteristic train of symptoms and pathological evolution of acute rheumatic fever." It will be recalled in this connection that the effects of vitamin deficiency, particularly of vitamin C, are not immediately apparent. In the guinea pig, for example, an appreciable period of time has been found to elapse between the actual exhaustion of vitamin C reserves and the appearance of outspoken scurvy, during which period pathological changes are progressing. Since this animal and man are very much alike in their need for a constant supply of vitamin C, it is not unlikely that without the appearance of actual scurvy similar pathological changes may occur in man and, by seriously impairing his resistance, prepare the way for an intercurrent infection. It may be that, after all, the elusive cause of rheumatic fever is manifold, and that vitamin deficiency is one of the contributing factors.

For Southern physicians the riddle of pellagra offers many unexplained problems. Pellagra does not appear to be due to a single nutritive fault, and it is not improbable that in its causation several factors, not necessarily similar in nature, are operative. Witness the interesting studies in this field by Spies, of Cleveland, and his remarkable results in curing the pellagra of old alcoholics by intramuscular injections of liver extract. Equally graphic was the success of Minot and his associates in treating alcoholic polyneuritis by giving a liberal diet carrying large quantities of the antineuritic factor, while at the same time the patient was permitted to imbibe in undiminished quantity his accustomed amounts of alcohol. Similar results have been achieved in the treatment of the polyneuritis of pregnancy. All of this would suggest that each of these disorders is related at least in part to a lack of the B complex, and furthermore, that this lack is not due in all cases to failure of supply. Some fault in the utilization of food must be assumed.

Much light was shed on this last problem by Castle when he demonstrated that nutritive disorders are sometimes due, not to failure of supply alone, but rather to an inability on the part of the person to make proper use of his food. The intake may be adequate, but because of some intrinsic defect in his digestive apparatus (or elsewhere) the person so handicapped is unable properly to elaborate or to utilize the available material. Reasoning thus, Castle demonstrated that pernicious anemia properly belongs among the deficiency diseases. The part played by intrinsic factors has been well illustrated by Strauss in his discussion of the "Role of the Gastrointestinal Tract in Conditioning Deficiency Disease." Recent literature contains numerous reports of injuries which have so interfered with the function of the stomach and intestines as to produce pernicious anemia. Gastrectomy, ulcerative lesions of the colon, bacillary dysentery, celiac disease, intestinal stenosis, and intestinal anastomosis, are among these conditioning disorders. In the same category should be placed those cases of beri beri which have been reported as accompanying pyloric stenosis, gastric carcinoma, gastric polyps, celiac disease, and other forms of intestinal injury. The experience of Spies in the pellagra of chronic alcoholism, and of Minot in alcoholic polyneuritis, to which attention has just been called, would indicate clearly that the nutritional fault in such cases lies in poor absorption from a damaged intestinal tract, rather than from faulty food supply.

In conclusion, nutritional studies of recent years have revealed two salient facts: first, that deficiency syndromes, in America, at least, are seldom clearly defined or easily recognized; they are as a rule complex in nature and correspondingly protean in manifestation; and second, that lack of supply is not the sole cause of nutritive failure; inability of the person properly to utilize his food is frequently a determining factor. Hereafter, in considering deficiency disease the physician must study the patient himself and the vicissitudes to which he has been subject, as well as the nature of his food supply.

FOOD ALLERGY: A COMMON PROBLEM IN PRACTICE*

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Food allergy, first described by Richet and later by Schloss, and since then by Vaughan, Andresen, Alexander, Eyermann, Gay, Ratner, Balyeat, Brown, Rowe[1] and many others is gradually assuming its rightful place in the minds of physicians. Most people at some time of life, and especially in childhood, probably have mild or marked food allergy. Vaughan,[2] in a recent analysis of all the people, 508 in number, in a small community, found evidence of food allergy through history alone in 62.2 per cent. My recent analysis of the histories of 2,000 students at the University of California substantiated these and other important findings of Vaughan.

DIAGNOSIS

Physicians will appreciate the frequency of food allergy in their patients only if they employ routinely the following diagnostic measures:

(1) Every history should be taken with the possibility of all types of allergy in mind. The history of any of the symptoms which are frequently due to food allergy occurring in the nasobronchial, gastro-intestinal, or urogenital tracts and in the central nervous system or the skin should suggest food sensitization. If in addition a history of inhalant, contact or drug allergy is obtained, the possibility of the presence of a concomitant food allergy must also be considered. However, allergy may develop in patients without previous personal or family histories of hypersensitiveness.

The tendency to inherit the propensity to develop allergy of any type and even specific manifestations such as asthma, eczema, or migraine, and occasionally to become allergic to specific foods or other allergens, must be considered.

The history may aid in revealing food disagreements which were previously known as idiosyncrasies and are often due to allergy. Children, and a few adults, moreover, dislike certain foods to which they are allergic. Many children intuitively refuse such foods, and gag and regurgitate when they are forced to eat them. Anorexia is a frequent result of food allergy.

(2) Next in importance as a diagnostic guide is trial diet. My elimination diets were first described in 1928,[3] modified in 1931,[1] and recently revised[4] and amplified with fuller menus and new recipes. Other trial diets have been successfully used by Brown, Alexander and Eyermann, and especially by Vaughan.[5] I have always recommended the modification of the elimination diet chosen for the patient by his history of definite food disagreements or dislikes and according to any definite skin reactions. However, if skin testing is absolutely impossible, many problems of food allergy can be solved by the use of elimination diets and history alone, which procedure is justified by the relief given the patient. When food allergy is suspected, therefore, diet trial should be used in the same way that other laboratory tests are used in the study of any other clinical problem.

(3) Skin testing must take a position subordinate to history and trial diets in the diagnosis of food allergy. Routine testing, it must be said, with reliable food allergens by the scratch method, is important, since the information derived especially from the more positive reactions is often of help. It is generally recognized, however, that skin tests are negative to 50 per cent or less of those foods which produce clinical allergies. A patient may give positive reactions to one or more foods and negative reactions to other foods causing symptoms. Cooke[6] recently stated that foods productive of rapid marked symptoms often give positive reactions, and that those causing delayed cumulative or chronic disturbances usually fail to react. Moreover, many positive reactions and especially slight and borderline reactions are not associated with any clinical or even potential allergy. Because of these facts, I usually modify my elimination diets only by substituting foods for those showing definite scratch reactions, or for foods to which definite disagreements or dislikes exist. My[7] recent study of intradermal tests with foods not productive of positive scratch tests showed many confusing positive, non-specific or delayed reactions which were of no aid in the diagnosis.

This attitude toward skin testing in food allergy is shared by Alexander, Eyermann, Figley, Gay and many others. Vaughan depends more on skin testing, though he emphasizes the paramount value of trial diets. He recently wrote:

*Read in General Clinical Session, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

"Too many doctors and patients alike feel that the skin test is the last court and conclude if the results of skin testing fail to relieve that allergy is not a factor."

(4) Vaughan especially has emphasized diet diary as an aid in the determination of allergenic foods. All foods eaten, with possible reactions from specific foods, are recorded from day to day. In my own work I have usually depended on frequent conferences with the patient and notes I have personally taken in regard to possible reactions from foods under suspicion.

Manifestations of Food Allergy.—In order to emphasize the many disturbances in all parts of the body which may arise from food allergy, I shall present statistical data which summarize my observations in private patients seen in the last fifteen years. My emphasis of food allergy does not minimize the importance of inhalant and other types of allergy. Careful physical and laboratory studies must rule out pathologic conditions which might account for symptoms which frequently arise from food allergy.

Gastro-intestinal Food Allergy.—Food allergy may produce erythema, edema, excessive mucus and smooth muscle spasm in any part of the gastro-intestinal tract. In the mouth, small tender vesicles, papules, and focal necroses or canker sores also occur and these may even arise in the pharynx and esophagus and probably in the stomach and duodenum, constituting a possible cause of ulcer in sensitized patients. Certain individuals, moreover, have sores and chapping on the lips and on the anus and eczematous lesions around the mouth and the anus. Bleeding of the mucous membranes, due to increased permeability of the mucosal capillaries arising from food allergy, occurs at times in children and may arise in adults as witnessed by intestinal and oral bleeding in one of my patients with allergic purpura. As in all types of allergy the sensitized tissue may be localized to the mouth, stomach or the whole or any small part of the bowel. The gallbladder and biliary tracts and the parenchyma of the liver itself are not exempt from allergic reactions.

With these facts in mind, it is apparent how the many symptoms which are indicated in my statistics in *Table 1* which I have emphasized in previous publications,[8] and which have been reported by other students, notably Duke,[9] Andresen,[10] Vaughan, and Gay,[11] arise from food allergy. In this article I would especially stress the frequency of these manifestations and their simulation of appendicitis, gallbladder disease, intestinal obstruction and at times of peptic ulcer. Unnecessary operations, especially on allergic appendices and gallbladders, are frequently performed.

Mucous colitis, as especially reported by Vaughan, cyclic vomiting in childhood, spastic constipation, as emphasized in my own work, soreness and pain in varying parts of the abdomen, probably colonic in origin, are often due to food allergy. Canker sores in the mouth, and a recent case with them in the pharynx and esophagus due to food allergy suggest that peptic ulcer may begin with such a lesion in sensitized patients. Food allergy may occasionally lead to or exist with actual pathologic tissue. Localized sensitization, moreover, may exist in the rectal and anal tissues leading to spasm, burning and pruritis ani, and, as pointed out by Alvarez,[12] in the liver and biliary tract, leading to pain and icterus. Functional disturbances

Table 1

STATISTICAL STUDY OF 270 CASES OF GASTRO-INTESTINAL ALLERGY

	Per Ct.
Male	30
Female	70
Ages	
0 to 10	6
10 to 20	6
20 to 30	17
30 to 50	44
50 to 70	27
Family history of allergy	66
Other allergies in patients (past or present)	
Bronchial	18
Nasal	33
Urticaria or eczema	34
Angioneurotic edema	3
Migraine or headache	36
Ocular allergy	1
Bladder allergy	1.5
Symptoms	
Canker sores	17
Gastric	79
Diarrhea	12
Constipation	43
Mucous colitis	14
Pruritis ani	4
Abdominal pain or soreness	60
Ulcer type of pain	5
Toxemia	25

	No. Cases
Food dislikes or disagreements	232
Duration of symptoms, 11 years	
Roentgen studies	
(1) Gastro-intestinal	
Normal	142
Abnormal (1)	36
(2) Gallbladder (2)	55
Stomach analyses	
Normal	107
Hypochlorhydria	14
Achylia	13
Abdominal operations	
Appendectomy	107
Gallbladder	10
Others (3)	9
Drug idiosyncrasies	16
Skin reactions	**Per Cent**
Foods	19
Animal emanations	8
House dust	7
Pollens	18
Miscellaneous	7

(1) Gastric retention in four cases, duodenal retention in one, spastic antrum in stomach, decreased motility in small intestine and hypermotility in the large bowel in one, hyperstasis in stomach and upper intestine in one, moderate duodenal stasis in five cases; marked dilatations of cap in one, spastic bowel in twenty-four cases.

(2) All normal except stones in one case, negative shadows in one, questionable pathology in two.

(3) Four hysterectomies, one gastroenterostomy, one increase in gastroenterostomy opening. Two for supposed intestinal obstruction. One for supposed perforation of ulcer.

arising from food allergy revealed by the roentgen ray have been reported by Eyermann and the writer[13] and recently affirmed by Gay and Andresen. I have stressed the importance of using as a vehicle for barium a food to which the patient is not allergic. Most patients with acute or chronic gastro-intestinal symptoms should be studied with trial diets and diet analysis for several weeks until it is reasonably certain that food allergy is not present or until some definite pathology is found.

Bronchial Allergy.—The relative importance of food allergy to the inhalant allergies is illustrated in *Table 2* in the study of 1,418 private patients with asthma. If inhalants were considered as a whole in this series they would probably hold an equal place with food. The main point to realize, however, is the frequency of food sensitization as one of the causes of asthma throughout life. Up to the age of two years it is often the sole allergic cause. Thereafter inhalants assume increasing activity, and probably need dominant consideration, but even in old age food allergy is not infrequently entirely responsible for bronchial asthma. In childhood food asthma is usually cyclic and non-seasonal in recurrence becoming more frequent and finally chronic as years advance. The preceding comments also pertain to allergic bronchitis which may be due to food alone and may be unaccompanied by wheezing or any other allergic manifestations.

Table 2

RELATION OF THE MAIN INHALANT SUBSTANCES TO FOOD IN THE PROBABLE ETIOLOGY OF 1418 PRIVATE PATIENTS WITH BRONCHIAL ASTHMA

0 to 15 years	469 cases
16 to 55 years	763 cases
55 years up	186 cases
	Per Ct.
Food allergy	57
Pollen allergy	49
Animal emanation allergy	24
House dust allergy	23
Other inhalant allergies and bacterial allergy less than	10

Perennial Hay Fever.—The important data on 68 cases of perennial hay fever in which food allergy was the main or entire cause are listed in *Tables 3* and *4*. My statistics indicate the frequent occurrence of pollen and other inhalant allergies in these patients. So-called recurrent head colds in children are often due to food sensitizations and many children who have chronically congested and blocked nasal passages, with the resultant sneezing, watery or mucoid discharge, nose picking, hacking, snorting and snoring which disturbs sleep and induces irritability and nervousness, suffer from food allergy. My statistics also point out that such nasal food allergy may arise in adult life. The average duration of symptoms was 8.7 years, many adults having suffered all their lives. Nasal allergy due to food, as well as inhalant allergy, has led to many operations, which fail to relieve because allergic reactivity cannot be destroyed with the knife. When any suspicion of allergy exists the secretions should be studied for eosinophiles for confirmatory evidence, as stressed by Hansel.[14] Cloudiness, opacity or mucous membrane thickening in the sinuses as

Table 3

STATISTICS ON PATIENTS WITH NASAL AND CUTANEOUS ALLERGY AND ALLERGIC TOXEMIA

	No. of Cases	Male Per Cent	Female Per Cent	Average Age Years	Past or Present History of: Bronchial Allergy Per Cent	Nasal Allergy Per Cent	Cutaneous Allergy Per Cent	Eczema Per Cent	Urticaria Per Cent	Angio. Edema Per Cent	Allergic Headache Per Cent	Abdominal Allergy Per Cent
Perennial hay fever	68	34	66	23 4-56	37	31	31				13	30
Urticaria	61	29	71	24 4-55	26	21		5	100	20	15	21
Angioneurotic edema	38	29	71	40 21-50	18	34		10	29	100	16	32
Eczema	48	42	58	26	18	12		100	29	3	10	29
Acneform dermatosis	19	21	79	24	11	16	32				26	32
Toxemia (allergic)	29	22	78	38	10	45	43				52	80

Ocular, bladder and uterine allergy occurred in 1 to 4 per cent of the patients.

Table 4

CONTINUED STATISTICS ON PATIENTS WITH NASAL AND CUTANEOUS ALLERGY AND ALLERGIC TOXEMIA

	No. of Cases	Family History of Allergy	Food Dislikes or Disagreements	Positive Skin Reactions					Duration of Symptoms
				Food	Animal Emanations	Dust	Pollen	Miscellaneous	
Perennial hay fever	68	69	43	30	21	26	54	7	8.7
Urticaria	61	65	38	44	18	15	15	15	2.1 (½-18)
Angioneurotic edema	38	53	44	47	21	13	26	24	4 (1/3-40)
Eczema	48	71	46	44	33	12	19	2	8 (1/3-61)
Acneform dermatosis	19	42	47	26	0	5	5	0	5.1
Toxemia*	29	80	45	29	14	3	17	0	....

Drug idiosyncrasies occurred in approximately 1/5 per cent of the patients.

*Twenty nose and throat and six abdominal operations because of toxic symptoms and headache. Eleven roentgen studies of the gastro-intestinal tract and seven of the gallbladder and thirteen stomach analyses were essentially normal.

revealed by transillumination or the roentgen ray, may result from allergy as frequently as from infection. Surgery is contraindicated unless gross infection is obvious.

Urticaria and Angioneurotic Edema.—The 61 cases of urticaria and the 38 cases of angioneurotic edema which I have found due to food allergy demonstrate the frequency of this cause in both conditions throughout life. My data on urticaria could be swelled enormously by the inclusion of all transient cases seen in children arising from food sensitizations. Most of our cases of urticaria and particularly of angioneurotic edema were persistent, of long standing, and in adults. The production of both these conditions from bacterial allergy is common enough in adults to make it imperative always to consider such a cause. The recent report of Emmett and Logan[15] of urticaria of 17 years' duration successfully treated with colon vaccine must be remembered. A patient of mine recently was relieved of a long standing urticaria by removal of an infected gallbladder. Another case of urticaria was due to an infected rectal fistula. Hopkins[16] has also recently reported urticaria from inhalant allergy arising from animal emanations and pollens. Chronic urticaria, due to drug allergy, must be remembered.

Angioneurotic edema due to food allergy may occur in any part of the body, producing severe pain and dysfunction from involvement of central or peripheral nerve tissues. Meniére's syndrome, intermittent hydrarthrosis, visual disturbances, transient swellings in the abdomen, intestines, bronchial or urogenital tracts, also arise from this cause. Recently one of my patients had transient swellings in the epigastrium and transient involvement of the lung parenchyma similar to that described by Cole and Korns.[17] Another patient had recurrent swellings in the tendon sheaths of the extremities, producing severe pain and spasms in the muscles, formerly attributed to neurosis.

Allergic Eczema.—It is probable that allergic eczema due to food allergy after infancy is the result of blood borne allergens absorbed from ingested foods reacting with sensitized cells in the cutis of the skin. Sulzberger would prefer to call this type disseminated neurodermatitis, and states that it is characterized by scaling, erythema and induration, is not associated with visible vesicles, as is contact eczema or dermatitis, and may occur all over the body, with a predilection for the face, neck, and flexural surfaces. Food, along with inhalant allergens, is causative, being associated with either negative or positive skin reactions. Infantile eczema is probably of the same type as indicated by the studies of Hill,[18] although Peck and Salomon[19] recently have stressed contact reactions to foods and dusts, especially that of feathers in infantile eczema.

Allergic eczema in adults may also be due to inhalants, as described by Sulzberger and Vaughan.[20] It may arise from silk, and in a number of my patients it arose from pollens. Contact dermatitis due to pollens and vegetation

are thought by Coca and his collaborators to arise from pollen or leaf oils, or from oils of foods and from various chemical and other organic substances.

My present series of 48 cases contains 12 children under three years of age. The others are adults over 15, with an average age in the entire series of 26 years. Since this series does not include many cases of infantile eczema, the frequency of food eczema in the first two years of life is not evidenced. Though reactions to inhalants occurred in a number of patients, marked evidence of their importance, along with food allergy, was obtained in only four or five subjects. Food allergy as the sole cause of eczema of the ear canals in four patients, of eczema behind the ears in two patients, or pruritis ani in four patients, and of eczema on the backs of the palms of the hands in three patients, stresses the marked tendency to its localization in small and specific areas. One woman had had aural eczema due to food for 60 years, and her daughter had had it for 30 years. The recurrent vulval excoriation I reported in 1931[1] was a similar condition in those mucous membranes which suggests the possibility of eczematous-like lesions from food arising in the mucous membranes of the bowel or bladder. Thus the occurrence of allergic eczema due to inhalants, especially to pollens and contact eczema, are of paramount importance in adult life.

Acneform Dermatosis.—In 1931[1] I reported food allergy as an important cause of acne, and White[21] in 1932 confirmed its frequency. In *Tables 3* and *4* I present 19 cases of such acne. Skin reactions were of no definite help, most of them occurring to foods which produced no difficulty. The marked exaggeration of the facial or back eruption previously noted in girls during menstruation was entirely relieved when the food allergy was controlled. Food allergy as an important underlying cause of acne must be generally appreciated.

Allergic Toxemia.—Toxemia due to food allergy was described by me in 1930,[22] and has been observed in a severe form in 29 patients. Many mild cases are not included in this analysis. These patients feel drowsy, dull, find it difficult to think and concentrate, and complain of lack of strength and pep. They awaken tired and frequently ache all over the body. The statistics show that allergic headache and especially gastro-intestinal allergy are frequently present. This toxemia due to food allergy is similar to that due to pollen which Kahn has described in children, and which I have also encountered in adults.

Allergic Headache and Migraine.—Typical migraine and recurrent headaches are often due to food allergy. Occasionally pollen allergy alone, or associated with food allergy, may cause recurrent headaches, and likewise animal emanations have been reported as causative. Recently I have relieved a patient of migraine which had not yielded to elimination diets by desensitization with a dilute colon vaccine.

The data on 247 consecutive private patients who have complained of recurrent headaches are presented in *Table 5*. Space will not permit a repetition of my former discussion[23] of this important manifestation of food allergy. Good results in 63.5 per cent, with poor or fair cooperation in 19 per cent, indicate average results which can be expected with the intelligent and continued use of trial diets. The poor or only fair cooperation in 19 per cent indicates that good results in a larger number might have occurred with accurate adherence to instructions by these individuals. The frequency of food allergy as a cause of migraine and recurrent headaches was first emphasized by Vaughan and since then by the writer, Balyeat,[24] Eyermann, DeGowin and others. The marked relief reported by all is not equalled by any other therapeutic treatment ever suggested for this malady.

Table 5

STATISTICS ON 247 PRIVATE PATIENTS WITH HEADACHE AS A MAJOR COMPLAINT

Ages	No. of
1 to 15 years	3
15 to 35 years	72
35 to 55 years	135
55 up	37
Males	66
Females	181
Duration of symptoms	
½ to 1 year	23
1 to 5 years	40
Over 5 years	184
Family History	
Headaches	113
Asthma	50
Hay fever	39
Eczema	8
Urticaria	12
Chronic indigestion	42
Skin reactions	
Foods	68
Inhalants	45
Miscellaneous	26

Personal history	No. of
Nasal congestion	80
Hay fever	35
Asthma	25
Chronic indigestion	98
Nausea	130
Vomiting	91
Abdominal pain	47
Constipation	142
Diarrhea	24
Eczema	40
Urticaria	68

Results	No. of	Per Ct.
Failure	43	17
Fair	49	19.5
Good	155	63.5

Cooperation		
None	6	19
Poor	15	
Fair	26	
Good	200	81

Other Manifestations of Food Allergy.—Idiopathic epilepsy not infrequently is due to food, and to a lesser extent to inhalant allergies. I

have one boy of 14 years who had Jacksonian attacks due entirely to egg allergy. One other lad has been entirely free for five years as a result of pollen therapy, and one boy is relieved of former nightly attacks of three years' duration when he does not overstep his diet. Menière's syndrome, transient deafness, often of long duration and transient paresthesia, paresis, and other nervous and even mental disturbances arise from allergic edema or swelling in the tissues of the brain cord or nerves, and possibly from smooth muscle spasm in the arteries resulting from food allergy. One woman had been confined to her bed most of the time for three years because of constant dizziness, weakness, diarrhea, and sudden acute attacks of vertigo, due entirely to allergies to all the cereals, milk, egg and several vegetables. Another woman had marked insomnia whenever milk or even butter was taken. Pain, stiffness and at times swellings in joints may arise from food sensitizations. The occurrence of high or low grade temperatures from food allergy must be remembered. Leukorrhea, painful menstruation and even menstrual bleeding may be due to this cause. Allergic purpura, described by Alexander and Eyermann,[25] must always be kept in mind. Bladder allergy reported by Duke[26] is receiving more attention. One of my patients had had severe bladder burning and prolonged incapacitating dizziness for twenty years. A man had had colicky pain in the left abdomen, radiating into the left lumbar region, necessitating morphine for relief. It simulated renal colic, pyelography was negative and elimination diets gave relief in ten days. Vulval burning existed in one woman for four years due to food allergy for which hysterectomy had been performed. Ocular allergy producing hemorrhage and smooth muscle spasm arose from food and pollen allergy in one patient. The possibility of allergic reactions to foods in the arteries leading to anginal pain, as reported by Werley, and of cardiac irregularities and especially of paroxysmal tachycardia originating from allergic reactions in cardiac muscle have received some substantiation through the demonstration by Sulzberger[27] of allergic reactions in the arteriolar muscle in tobacco allergy.

TREATMENT

When a diet has been found by the methods already discussed which relieves the patient's symptoms, it must gradually be enlarged by the addition of one or two foods a weeks, according to the plan recommended for the type of trial diet chosen by the physician. The method of trial dieting with my revised elimination diets, menus, and recipes, has been republished in a recent article.[4] Food allergy is best relieved by a continued elimination of causative foods over a period of months or years. To obtain the best results, such exclusion should be absolute and foods should not be fed for testing purposes oftener than once every four to six months. At times tolerance returns in a few weeks; it may never return.

With the reinstatement of a food it must be remembered that symptoms may return immediately or in a few hours, days, or even months, depending on the degree of established and natural tolerance the patient may have gained. However, one manifestation may disappear, leaving potential food allergy to reappear in another manifestation.

Subcutaneous desensitization with food extracts or oral desensitization with gradually increasing amounts of food have yielded results in a few hands. Propeptan therapy has not been successfully used in America.

It is important to state that the control of associated inhalant or other sensitizations, especially in nasal and bronchial allergy, or in allergic eczema, is imperative in many patients if good results are to be expected from the elimination of allergenic foods. Diets must be prescribed with due regard to the caloric, vitamin, and mineral requirements so that undernutrition or unwise weight reduction do not occur.

Success in the control of food allergy depends on the accuracy of dieting. In very sensitive patients the exclusion of a causative food must be absolute. Even a trace of butter in a milk sensitive patient may precipitate symptoms. Until results are assured, therefore, patients should eat at home or their meals should be prepared by one who appreciates the danger of trivial breaks in the diet. Eating in restaurants and hotels usually ends in grief and resulting symptoms are apt to confuse the real importance of food allergy in the minds of the physician and patient alike.

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Fitzhugh Bldg.

ALLERGIC HEADACHE*

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That headache, particularly that of the migraine type, might be associated with allergy, especially to foods, has been suggested by various authors, notably in this country, by Joseph L. Miller, Rowe, Eyermann, Rinkel and Balyeat, and Vaughan. French authors as early as 1850 grouped migraine with hay fever, asthma, eczema and certain other conditions, as a manifestation of the exudative diathesis. With the advent of the allergic concept an explanation for this apparent relationship was available, and since the preliminary work of the authors mentioned above there has been a fairly general acceptance of the idea that headache may at times be allergic. There is not as close agreement among investigators regarding the degree of importance of allergy in the etiology of recurrent or periodic headache of the migraine type. Some feel that while it is at times responsible, allergy is only a secondary factor. Others feel that it is a very important factor.

The question has also been raised as to whether headache, due to allergy, should be called migraine, or whether allergic headache and migraine are two entirely distinct entities. In an effort to answer these questions the writer has made an intensive study of his series of patients with allergic headache, to determine, if possible, whether we are dealing with a true migraine or with some other type of chronic or recurring headache.

The conclusion of this study is summarized as follows: Whereas, in our first series of so-called allergic migraine, treated purely on the basis of food allergy, and reported in 1927, we were able to give adequate relief to 36 per cent; in the second series, reported in 1933, the incidence of adequate relief had been increased to 51 per cent. There was an additional 20 per cent in which there appeared to be food allergy or other allergic manifestations, but in whom dietary restrictions did not relieve the headaches. Thus, in a little over 70 per cent of all of the cases of recurrent paroxysmal headache which we have seen in the last 10 years there is an allergic factor and about 50 per cent can be satisfactorily relieved, if not entirely so, by allergic methods.

An attempt was next made to find, if possible, any difference between those who were relieved and those who were not relieved, which would enable us to foretell good or poor results. The comparison was made between the 50 per cent with relief and the approximately 30 per cent with no relief whatsoever, and little or no evidence of an allergic factor. The 20 per cent who were not adequately relieved but did show evidence of an allergic factor were not included in the comparison.

With two exceptions as noted below there was no difference whatsoever in the symptomatology of the two groups, or in the history of the evolution of the malady. A composite picture of each group corresponded to the composite picture of true migraine. Not every case experienced ocular manifestations or other prodromata or sequelae classed as characteristic of true migraine, but the occurrence of these manifestations was distributed through both groups in about equal percentages and in about the frequency usually recorded in any series of true migraine. We were brought to the conclusion that the cases of re-

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current allergic headache which we had been treating were predominantly cases of true migraine, both those which were relieved and those which were not.

There was no clear-cut differentiation between the two groups that could be based upon location of pain, prodromata, ocular symptoms, mental, vasomotor or peripheral nerve symptoms, frequency, duration, gastro-intestinal symptoms, non-allergic precipitating factors, or urinary manifestations. The two points mentioned above which showed a tendency to differentiation in the two groups were unilaterality and regular periodicity.

Better results from allergic treatment were obtained distinctly more frequently in those patients in whom the headache was usually and predominantly one sided than when the headache was usually or predominantly bilateral. Poorer results were obtained in those in which the periodicity was regular, especially when it accompanied the catamenia, than in those in which the attacks occurred at irregular intervals.

To be sure, allergy may cause headache other than typical migraine. There may be headache due to sinus blockage from an allergic nasal reaction, but in my experience this is a sinus type of headache, easily recognized as due to intranasal disease, in contrast to the migrainous type. Also, I have seen a few headaches associated with allergic neuritis. It sometimes takes the form of trigeminal neuralgia, sometimes a neuralgia of the occipital nerve. In my experience these are usually due to food allergy. I do not mean that trigeminal neuralgia is usually due to food allergy. Once in a long while one will find that a case of trigeminal neuralgia is due to allergy, and when this is the case it is usually food allergy.

The question arises as to what percentage of the population suffers from allergic headaches. The writer has made an allergic survey of an entire population in the village of Clover, Virginia, and enough of the neighboring territory to complete a total of 508 individuals. This included all inhabitants at all ages. Approximately 10 per cent of the population was found to be frankly allergic, with definite history of hay-fever, asthma, urticaria, migraine. An additional 50 per cent had experienced some mild or evanescent allergic manifestation in the past. The difference between the two groups lay principally in the fact that the former or frankly allergic usually did not know the cause of their malady, while the latter, or minor allergics, comprising 50 per cent of the population, had no difficulty in recognizing the cause of their symptoms. This was because the cause was usually some substance with which the individual came into only occasional contact and which could easily be recognized. The minor allergic, recognizing the cause, was able to avoid it, thereby relieving himself and obviating the necessity for consulting a physician. Among the foods, for example, the minor allergic was more likely to be hypersensitive to occasionals such as onion, cabbage, strawberry, tomato. We know from experience in office studies that the major allergic is more often sensitive to staples such as wheat, egg, milk, and the like.

When, in the survey we arrived at a study of the incidence of recurrent headaches due to foods we were surprised to discover that as high as 7 per cent of the entire population had experienced recurrent headaches due to the eating of certain foods. And without exception they were able to name the foods responsible for the symptoms. A larger percentage of the population had had chronic or recurrent headache, but this is the proportion of the population who had convinced themselves that specific foods were responsible. Here again it was foods eaten relatively infrequently. Of those in the population who gave a history of chronic or recurrent headaches, 21.4 per cent attributed the headaches to food idiosyncrasy.

We may, therefore, conclude that in a general population, such as the one studied, about 7 per cent may have occasional headaches due to food allergy. Food allergy may play a part in the etiology of about one-fifth or all of the chronic or recurrent headaches observed in a community.

It is in this group of minor allergics that we might be inclined to use the term allergic headache rather than allergic migraine. Headaches in this group are relatively not severe and are often unassociated with prodromata, ocular manifestations, or gastro-intestinal symptoms. But even here there appears to be still a predisposition toward unilateral involvement, the headache usually coming over one eye or the other.

As to whether this mild type of headache should be called migraine, there is room for argument, depending primarily on one's definition of migraine. If one insists on the presence of ocular manifestations such as scotomata and gastro-intestinal symptoms before accepting a case as migraine, some of these will not fall into this category. If on the other hand one accepts the literal translation of migraine or hemicrania with

Osler's very broad definition, "a paroxysmal affection characterized by severe headache, usually unilateral and often associated with vomiting and disorders of vision," then most of these cases still fall into the category of migraine.

In addition to these two surveys of chronic allergic migraine and of the incidence of headache due to foods in a homogeneous population, we made a third survey, of the incidence of headache due to food allergy among major allergics, that is, among those patients reporting to the office for allergic study for some frank or chronic allergic manifestation. We found that approximately 30 per cent of those frankly allergic individuals studied had experienced recurrent or paroxysmal headaches due to the ingestion of specific foods. This study was made on a consecutive series of admissions of cases of asthma, hay fever, urticaria, eczema, and so forth.

CONCLUSIONS

Upwards of 7 per cent of the population may at one time or another experience chronic or recurrent paroxysmal headaches due to food allergy.

Upwards of one out of every five chronically recurrent headaches may have an allergic etiologic factor.

Nearly one out of every three frankly allergic individuals may experience headaches at one time or another due to food allergy.

Headaches due to food allergy, as a class, present the characteristics of true migraine. There are many cases of mild headache, not typically migraine, and indeed these occur in individuals who at other times have severe true migraine from the same cause. The term allergic headache might be applied to the mild cases and to those due to intranasal disease, allergic neuralgia, and probably also to true intracranial angioneurotic edema. The writer feels, however, that it will eventually be demonstrated that the mild allergic headache described in his series of minor allergics differs from the allergic migraine manifested by major allergics, in degree only.

Sensitization studies of migraine are justified inasmuch as by allergic methods fully 50 per cent may be adequately relieved. Such studies include not only skin tests, but also careful supervision with the keeping of a food diary, the use of trial or elimination diets when necessary, and close collaboration between physician and patient for many months in order to discover all of the offending allergens, including those which have failed to give positive skin reactions.

CLINICAL SIGNIFICANCE OF CHANGES IN THE FIRST HEART SOUND*

By GEORGE L. CARLISLE, M.D.,
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While it is perfectly true that snapshot diagnoses are dangerous, it is just as true that to be bound invariably to a long routine form in the study of every case is just as untrustworthy. The only clue to a correct diagnosis often is one small observation made in a split second by the clinician of experience. This clue is brought to the attention of the examiner when he, upon making some routine examination, suddenly finds something which he immediately recognizes as abnormal and from his clinical knowledge knows that this abnormality is probably due to one of several possibilities. From this clue by a process of elimination a correct diagnosis is made.

When I was asked by our president to present some worth while clinical fact in the short time of 15 minutes, and was told that this fact must be something which had served me well in my personal experience in the practice of medicine, it immediately occurred to me that certain changes in the character of the first sound of the heart had often served to help me in making a correct diagnosis and that a short discussion of these changes as I have found and interpreted them might be of some help to you in your daily bedside practice. I sincerely hope this proves to be the case.

Upon routine auscultatory examination over the heart, two sounds are usually heard. These are referred to as the first and second heart sounds. We often obtain knowledge of great clinical value from various changes in these sounds. We evaluate these changes according to our knowledge of the normal sounds heard in health.

Much study has been directed toward the various changes which take place in the second heart sounds and much knowledge of sound clinical value exists regarding these changes. There are certain diseases which practically invariably cause changes in the first sound of the heart which are quite characteristic. It is about these changes in the first sound that I wish to speak.

Normally, the first sound of the heart is

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somewhat softer and definitely longer in duration than either the aortic second or pulmonic second sounds. These sounds have been described as "lubb-dup"—the "lubb" representing the first sound and the "dup" the second sound.

I wish to speak of three common diseases, or abnormalities, which cause a definite increase in the first sound of the heart, and briefly discuss other changes in this sound which sometimes occur.

The three diseases causing increase in the first sound in their order of frequency in my experience are: (a) emotional upsets, or instability, (b) mitral disease with stenosis, and (c) thyrotoxicosis.

The emotional or nervous patient is the most common type we see, and very often this is the type of patient who consults the physician for relief from "heart disease." The complaints of such a heart case are usually numerous, but chief, at least among them, is the pounding of the heart. Upon auscultation over the heart in this condition one is often struck by the predominance of the booming first sound of the heart which overshadows all other heart sounds. In many of these persons the degree of general self-control may completely mask temporarily all other signs of emotional, or psychic, strain. It is here that this characteristic first sound is of much clinical value. The degree of tachycardia may not be in keeping, since some of these patients have a pulse slower than one would expect when emotional strain is the only etiologic factor. Tachycardia of 100 or more, however, is the rule. In this type of heart symptoms no other variation from the normal is found, but the first sound is so altered from the normal that the clinician of experience will immediately recognize that it constitutes an abnormality. He will, therefore, institute a search for the cause, often leading to a correct diagnosis which otherwise could be easily overlooked.

In any degree of mitral disease with stenosis the first heart sound is, I think, practically pathognomonic. I have seen many cases where this change in the first sound was the only abnormality found in the auscultatory examination of the heart while the patient was at rest. In contrast to the booming first sound, just described in patients suffering from emotional instability, the first sound in mitral stenosis is increased, but it is a sharp, snapping sound, regardless of the rate of the heart. This sound is so characteristic of mitral stenosis that it can be relied upon almost as much as the presystolic murmur. Upon hearing this type of first sound the examiner should put the patient through some exercise, bringing out the characteristic presystolic murmur which rises with a rush, to stop short with this sudden snapping first sound at the apex. In any patient with a short snapping first sound at the apex of the heart mitral stenosis must be thought of and carefully excluded.

In the presence of thyrotoxicosis of any type one finds a very characteristic type of heart action. The rate of the heart is increased, but the most descriptive term used with reference to the heart beat is the so-called "angry heart." In this disease the first sound of the heart is loud and the apex strikes against the chest wall with sufficient force to be felt with the hand laid over the precordium. Upon auscultation the first sound will be louder than any other sound of the heart, and while it is somewhat like the heart in emotional instability, the first sound in thyrotoxicosis is even more violent in its action.

In general, I would say, when the first sound of the heart is the loudest of all the heart sounds, suspect some definite abnormality. This is even a safer rule to follow than the suspecting of disease upon hearing an accentuated aortic or pulmonic second sound.

I know of no condition which is attended by a reduction in the intensity of the first heart sound. There are, of course, many states which may bring about a general reduction in the heart's action and thereby make all the heart sounds less clearly heard, but no disease, as I said above, brings about a reduction in the intensity of the first sound alone.

At times one hears a double first sound at the apex of the heart, but so far as I know no adequate explanation has been given for this phenomenon. It has been said that bundle branch block may be diagnosed, or at least suspected, by a double beat at the apex, but at least for the present I am depending upon the electrocardiograph to make such a diagnosis.

JAUNDICE AS A SYMPTOM*

By OLIVER C. MELSON, M.D., F.A.C.P.,
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Jaundice was recognized as a symptom of liver disorders by the ancients, and since its recognition it has intrigued clinician, surgeon, biochemist and physiologist. Since 1914 there has been renewed interest in the vagaries of jaundice and many new links have been added to the chain of knowledge concerning it.

While the obstructive type is the most common and in many instances handled with greater ease, it is not the type which falls to the lot of the internist for classification and relief. This discussion will, therefore, chiefly embrace the toxic and infectious, and hemolytic forms of jaundice.

Clinically, the toxic and infectious group may be further divided into four sub-groups: (1) those due to infections, as in the epidemic jaundice; (2) those due to poisons such as cinchophen, trinitrotoluene, tetrachlorethane, arsphenamine, chloroform, and the like; (3) those due to *Spirocheta icterohemorrhagica;* and (4) those due to intrahepatic changes associated with pregnancy, heart disease, exophthalmic goiter, and the like.

To crystallize the symptomatology, I shall quote a fairly typical history.

Mr. H., aged 45, had bilateral antral windows made three days apart. Two days later he noticed that the urine was unusually red and dark. At about the same time the skin became jaundiced. Associated symptoms were bloating after meals, belching, anorexia, nausea and vomiting. There was no pain, but the patient complained of slight itching. Fever or sweats were absent. The liver was enlarged moderately and tender. The systolic blood pressure was 104, diastolic 80, pulse 74. Laboratory tests showed the stools to be acholic at times, the duodenal contents and urine to contain bile, the icterus index to be 18.

This general symptomatology is usually indicative of one of the non-obstructive types of jaundice. Some variations and additions occur which help in the differential diagnosis and in the prognosis. For instance, acute yellow atrophy of the liver may simulate a simple catarrhal jaundice in its early stages. After a few days grave symptoms occur such as severe headache, delirium, vertigo, nausea and vomiting, convulsions, coma and death. The liver is smaller than normal, due to the acute necrosis and autolysis of the liver cells. The pigmentation of the skin varies in density, but may be extremely deep in some cases. Also, it is said to be absent in some. The cholesterol and sugar of the blood are both diminished. The urine contains an excess of urobilinogen and bile pigments, and sometimes leucin and tyrosin crystals may be demonstrated in concentrated specimens.

These severer forms of jaundice have been more frequent during and since the war. Munition and aeroplane workers were often afflicted from exposure to the trinitrotoluene of high explosives and to the tetrachlorethane used on aeroplane wings. The latest offender is cinchophen and its derivatives. It is said that the chance a user of cinchophen runs of being poisoned is about 1 to 500,000, which probably puts it into the same rank as the benzol and phenol groups as a cause of granulocytic neutropenia. You all are familiar with the jaundice associated with arsphenamine administration. Since it is usually recognized earlier than other types, it has lost some of its mortality.

The treatment of simple catarrhal jaundice is well-known. The patient should remain in bed. The diet should be simple and contain an excess of carbohydrate. Fats and eggs are contraindicated. The use of the Lyon tube for duodenal drainage, I have felt, has been of distinct value in shortening the duration of symptoms. Whether a coincidence or not, acholic stools have ceased after a diagnostic drainage of the duodenal contents. Sometimes constipation is obstinate and then the free use of magnesium sulphate has been beneficial. If gas is annoying, a little bromide with charcoal may be used effectually.

In the severer forms of intrahepatic jaundice, that is, in those in which an etiological factor is present which may eventuate in atrophy of liver, the first indication in treatment is to remove or withhold the cause. If the patient has been seen early enough this alone may result in complete and permanent clinical cure. This brings up the subject of "latent jaundice," that is, cholemia without choluria or icterus. In cases of syphilis, it is advantageous to make estimations of the icterus index, and if there is an increase of serum bilirubin, injections of neoarsphenamine should be discontinued. Glucose by mouth or intravenously is apparently of distinct advantage in the amelioration of symptoms and in effecting a cure. The blood

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sugar values in my experience are usually low, but even if within normal limits, glucose is of value. In the toxic jaundice produced by arsenical poisoning, sodium thiosulphate is beneficial and may be given twice daily in 15-grain doses intravenously if necessary.

Specific therapy there is none for toxic or infectious jaundice. Cholegogues are not indicated. Where the damage of the liver is severe, general supportive measures, such as transfusions, are necessary. Calcium is also advocated, but I do not believe it has as much value in these cases as in the obstructive types.

Without advancing any reasons, I believe the controversy about hemolytic jaundice has been definitely settled and its existence as a clinical entity fully established. Clinically we recognize several forms, such as the chronic hemolytic or acholuric jaundice, the acute hemolytic jaundice accompanying snake bite, black water fever, and so forth, and the jaundice accompanying pernicious anemia. With seeming unconcern, I am ignoring the first two groups and am directing your attention to the pernicious anemia group.

The lemon tint of the skin of the pernicious anemia patient is familiar, but sometimes, unless the symptom of jaundice be thoroughly investigated the diagnosis may be missed. This is especially true if there has been antecedent cholecystitis or cholelithiasis.

Evidences of blood destruction may be determined from an analysis of the serum bilirubin, as well as by blood count and hemoglobin estimation. The presence of urobilinogen in the urine and increased urobilin in the duodenum are also valuable in estimating blood destruction in pernicious anemia. The van den Bergh diazo reaction may assist in the differentiation between hepatic and hemolytic jaundice, but I have not found it an absolute guide.

Treatment of the jaundice associated with pernicious anemia, of course, entails treatment of the fundamental disease. As remission approaches, the jaundice is lessened. However, in subsequent relapses, the jaundice may be deeper than originally.

I have purposely avoided discussion of the theoretical and experimental aspects of this subject. My object in presenting it is to call to attention the types of medical jaundice and their chief differentiating points. Perhaps it is wise to consider all jaundice as obstructive until evidence to the contrary accumulates. However, I feel as much chagrined as the surgeon when he operates upon a jaundiced patient whose lesion is in the hepatic parenchyma rather than in the biliary system. It is not always possible to make the distinction, but at least the effort should be made.

Finally, I wish to emphasize the conception that jaundice is not merely a symptom of hepatic disease but also is a symptom of importance in certain hematopoietic disturbances.

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THE HUMAN BREAST AND ITS FUNCTION*

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In a period extending over many years, during 14 of which routine and systematic observations have been made upon the human breast, many pieces of information have been gathered which should be of value to those of us who are called upon to decide questions regarding it.

These questions must be considered from three points of view, namely: (1) medical; (2) functional; and (3) esthetic.

The remarks I shall make are based upon over 125,000 observations made mostly in the service of the newly born at the Touro Infirmary, and also in institutional and private practice. It is not my intention to convey the impression that the breasts of 125,000 individuals have been observed; but, that number of observations have been made upon the human breast and include: the yearly observations of the breasts of growing girls in an institution, whose ages range from 8 to 21 years; daily observations upon the breasts of the mothers of the newly born; monthly, or even more frequent, observations upon lactating breasts in the follow-up division of the service of the newly born; observations of the breasts during pregnancy of mothers whose breasts have continued under our supervision; and the breasts of the newly born themselves.

It must be mentioned here that with the inauguration of the service of the newly born 14 years ago the responsibility of the care of the

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breasts of the mothers was placed with the pediatric department. Of course this pertained only to the free service in the institution.

It will be seen from the various sources available for study: (a) that the developing breast could be observed with its occasional pathology; (b) that the growing breast could be studied during its various evolutionary stages, namely. puberty, adolescence, pregnancy. puerperium. lactation, and weaning; and (c) that the human breast could be studied from the esthetic viewpoint.

Before entering upon the discussion of the subject it must be first stated that the breast is that part of the body which contains within it the mammary gland, and that the mammary gland is the functioning part of the breast. The areola is that part of the breast under which normally the receiving ducts for the smaller milk ducts are situated, and these latter ducts terminate in several small openings in the nipple through which they empty.

In the allotted space of time naturally only a limited consideration may be given to this vast subject.

A knowledge of the embryologic development of the mammary gland should cause one to be constantly on the alert for evidence of abnormalities. In the human embryo there are in the milk line several gland anlages. This is also to be found in lower animals, such as, for example, the dog.

In the human, however. these anlages in the process of evolution disappear, and normally there remain only two, one of each side. Should this evolution not take place normally, there will result supernumerary mammary glands or nipples, or both. We have seen as many as six mammary glands in one human being. When this occurs and the units are complete, a drop or two of milk, or even much more milk may be expressed therefrom following childbirth.

Frequently, however, a discrete supernumerary mammary gland may exist without the nipple, but with an outlet, and at times even without the outlet. During menstruation these glands may temporarily enlarge. But of especial interest is their evolution following childbirth, when they go through the various stages that the normal glands do, but because of not being stimulated by sucking or withdrawing of the milk therefrom, they subside in about eight days, while the normal gland continues in its evolution to its natural function, the production of milk.

The supernumerary glands should not, as is frequently the case, be confused with neoplasms and be subjected to surgery. A knowledge of the existence of the milk line, and the location of discrete mammary masses in these lines, should spare the woman any unnecessary surgery.

An interesting observation upon the breast is the engorgement frequently found in the newly born. At one time it was believed that this was due to trauma. While trauma of the breast of the newly born may very often result in a mastitis, the engorgement to which I refer is distinctly different and is not an inflammation; but, because it occurs at approximately or a little before the normal stage of engorgement of the mother's breasts it would seem to be most probable that it is also due to a release from the inhibiting influence of the placenta over the functioning of the mammary glands. The same observation with these engorged glands as with the supernumerary mammary glands in the mother has been noted, namely: if they be left alone they will subside without trouble. If they are stimulated, which is bad practice, a drop of milk occasionally may be expressed from them and because of the trauma, incident to this milking procedure, an abscess will frequently follow.

We have no positive evidence, but it is highly probable that an inflammation or an abscess at this time may impair the gland so as to interfere with its future function, or even its future development.

There may be many factors during the growth and development of the individual which may so involve the mammary gland as to interfere with its growth and ability to function at the proper time. It is possible that some of the diseases which have a predilection for the glandular structures of the body, such as mumps, may be included among these.

In our observations we have found cases in which there were differences in the development of the two breasts of the same individual, as well as great differences in the function of the two sides. In one case there was a difference in the production of milk between the two breasts of five ounces.

Early in life abnormalities of the milk apparatus may be detected; more particularly is this so with regard to the supernumerary nipples

and areolas. Very noticeable changes are not likely to be present if the milk system is normal, except in endocrinopathic subjects, until the approach of puberty. At this time a decided change takes place in all three factors which are the indices of potential functioning. These are: the nipple, the areola, and the mammary gland. At this particular stage of development the areola enlarges both in circumference and in prominence; the nipple widens, and the erectile tissue in it becomes more active; and the mammary gland enlarges within the breast; while the breast may enlarge in proportion to the enlargement of its mammary gland or much more rapidly. Racial, endocrine, and esthetic factors have their respective influences upon the appearance of the ultimate breast and manifest themselves during adolescence.

Elsewhere[1] I have described the different types of nipples, areolas, and breasts so that for brevity mere mention of my classification is made here:

Nipple
- Retracted
- Inverted
- Flush
- Infantile
- Normal
- Large
- Cauliflower
- Pacifier

Areola
- Infantile
- Small
- Medium
- Large
- Flat
- Pouting

Breast
- Infantile
- Globular
- Conical
- Pear-shaped
- Pendulous
- Lumpy

Size of each type may be small, medium or large

With the advent of pregnancy another evolutionary change takes place in the human milk system. These changes may begin at a variable time, depending upon the activity of the response of the system to the new situation, and to the normality of the milk apparatus. Usually they are noted from the second to the fourth month. The greatest change takes place in the mammary gland, which enlarges and becomes firm, and, if the breast is small, the skin is so stretched as to result in the production of striae in the skin. This is a good sign for the successful production of milk. Of course, if the breast is large there may be a great increase in the size of the gland with no noticeable change on the skin surface, and still the gland may be a good producer.

In the areola are the next greatest changes. The type of the woman, whether blonde or brunette, will influence these changes, only in so far as the amount of pigmentation is concerned. The areola becomes widened and darker, and there appears a secondary pigmented area beyond the primary areola. These changes are more pronounced in brunettes. This is also a good prognostic sign as to function.

The least of the changes occur in the nipple, where very little of moment is noticed. There is, however, an evidence of function here which may be manifested to a greater or lesser degree, namely, the secretion of milk, which may be an occasional drop or two, or more. Not infrequently this secretion, plus perspiration, plus powder, plus epithelial cells, will form crusts under which may lurk infectious organisms such as those which produce thrush.

While the nipples show the least changes, they certainly require the greatest consideration of the three factors of the milk apparatus at this time. Besides the necessary hygiene to prevent possible infection, stimulation of the nipple is necessary to make it easily graspable by the baby for nursing. Soap, water and olive oil are all that are necessary in the care and hygiene of the nipples during pregnancy, besides manual stimulation.

The breasts should always be examined during pregnancy. False modesty will frequently result in the non-correction of inverted nipples. Inverted nipples, if allowed to go uncared for, are the greatest contributing factors to irritated and fissured nipples and perhaps to abscessed breasts, during the evolution which takes place at the time of the puerperium.

The most interesting of the evolutionary stages in the life cycle of the human mammary gland occurs during the puerperium. For two or three days following delivery, and sometimes even for four days, the changes are gradual in the milk apparatus. Usually on the fifth, but occasionally on the fourth day, the gland becomes painful and firm. On the following day the milk which, up to now, has been scanty, comes in quite freely and increases daily in quantity for several days. The mammary gland becomes softer in the next 24 hours, and the milk secretion increases. Much can be done for the comfort of the mother by the application

of the breast-dressing of the writer, which has already been described[2].

During the period of lactation, while the glands are functioning properly, no noticeable changes occur. Toward the end of lactation, however, the pigmentation in the outer or secondary areola decidedly diminishes, and later almost, if not entirely, disappears, and the breast loses its firmness. At this time, when weaning is desired, it is not necessary to put the mother through the ordeal of binding, purging, and starving. All that is necessary is to stop stimulating the gland by discontinuing the nursing or the milking, and to apply the breast dressing referred to, and in 24 hours the evolution of the nursing breast is completed, with no inconvenience to the mother.

Something should be said about the esthetics of the human breast, and especially so about the esthetics of the functioning human breast.

During the period of growth and development of the human female if conditions remain normal nothing need be done with regard to the milk system until puberty, except to endeavor to prevent those infections which have a predilection for glandular structures. If evidence of abnormal growth or development takes place the cause thereof should be ascertained and corrected, if possible, because many endocrine disturbances have their influence upon this system. At the approach of puberty, when the secondary sexual characteristics manifest themselves, valuable information can be given which will assist greatly in the future physical appearance of the individual as regards the breast. There have been numerous instances in our observations where the breasts have been terribly distorted, some by being pulled down and bound tightly to the body, while others have been pushed up and likewise bound tightly so as to give the appearance of a flat chest. In many instances these breasts, which were, apparently, judging from the three factors mentioned above, potentially good producers, were unable to perform their function.

It is quite possible that these young women were either never properly advised with regard to the care of the breasts or were not advised at all. With the use of properly fitting brassieres, or uplifts, these conditions could have been averted.

Throughout pregnancy, also, the breasts, at the time when they enlarge, should be properly supported.

When the breast goes through its greatest evolution, namely, during the puerperium, much can be accomplished to conserve its appearance for the future.

During the period of lactation a great amount of harm may take place from the esthetic viewpoint. At this time the breast, weighted with milk, if not supported becomes longer and longer, with the result that after lactation is over its appearance is certainly not a subject for the artist to depict.

Finally, I wish to say a word about the fallacy of forced feeding for the lactating mother with the blind hope of increasing milk production, a procedure which is universally but unwisely employed. It is very likely that the endocrine system so adjusts the metabolism of the lactating mother that her individual caloric requirements are adjusted and decreased to the extent that with her ordinary diet or a very little more she is able to make milk for the baby and still have enough for herself. Clinically, certainly, the lactating mother who is taking extra food in the attempt to produce more milk, and who is putting on weight, is positively by actual measurement and weighings not producing more milk, but is sacrificing her figure. There is a natural tendency, very probably endocrine in nature, for a woman to become matronly in appearance after childbirth. If to this is added the unfortunate and unwarranted practice of forced feeding there is certainly nothing left as the artistic and youthfulness and attractiveness of the young woman disappears. This is followed later, frequently, by attempts both dietary and otherwise to restore the natural figure, but with doubtful and usually not satisfactory results.

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THE CONTROL OF TUBERCULOSIS IN CHILDHOOD*

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Denver, Colorado

It is with reluctance bordering on trepidation that one approaches the discussion of this subject before an informed audience. The broad requirements of prophylaxis in this dread contagion of early life have been so well developed by abler hands that it would seem an unwarranted assumption to offer here any suggestions for revision or refinement. The justification for such an endeavor, nevertheless, is clear. With the undisputed facts now in our possession relating to the widespread prevalence of tuberculosis among children of school age, with the well attested observation that there are 150,000 deaths annually from this infection in the United States, that there are 1,000,000 active, diagnosed cases and 2,000,000 unsuspected cases, sowing seed for future crops where there may be no season of drouth, the arrest of this major disorder of mankind becomes the concern of all. The genius of medicine which has coped so successfully with ancient plagues and has mitigated the ravages of so many others has shown poorer accomplishment in the suppression of a universal enemy that continues its challenge to human wisdom and understanding. In spite of the notable decline in tuberculosis mortality during the past three decades, there is probably no decrease in the number of infected persons; by the fourteenth year approximately 75 per cent of city children, Sir Robert Philip[1] asserts, will show positive skin tests, which tell the story of family or neighborhood contact, an impure milk supply, and insanitary surroundings.

It seems particularly appropriate that, following the golden jubilee of Koch's great contribution to science, we should be eager to appraise critically the various factors of the entire tuberculosis problem, to readjust ourselves in the light of 50 years of effort, and to reconstruct, if it seems expedient, the conventional views now commonly accepted relating to prevention and control. We are reminded, in reviewing this half century of intensive investigation, that many distinguished scientists have devoted their talents to research in this field without filling the great gaps in our knowledge of tuberculosis. As milestones on the way, subsequent to the determination of the causative organism, we record the discovery of tuberculin by Koch in 1890, the discovery of the x-ray by Roentgen in 1895, the tuberculin skin test by Pirquet in 1907, the intradermal reaction of Mantoux, the percutaneous test of Moro, the ophthalmic response of Calmette, studies on allergy and immunity, the rest treatment, sanitorium management, and the introduction of vaccination. It has been definitely shown, in addition, from the mortality reports of London, that the distribution of tuberculosis throughout the world may be traced in cycles of about 100 years, with marked rise and fall, regardless of any suppressive measures, similar to the altered virulence noted in the natural history of other communicable diseases such as scarlet fever, smallpox, diphtheria and typhoid. So it would appear, as Cummins[2] expresses it,

> "that tuberculosis, in spite of the fact that the etiological agent is known and that it has been the subject of endless investigations, is still very imperfectly understood; its manifestations at different age periods and under different cultural and social conditions vary as greatly as if not one but several diseases are concerned."

Brownlee's[3] analysis of death rates suggests that behind tuberculosis mortality lies a complex and possibly unknown associate.

So we may be amply justified in believing that an *impasse*, a dead level, has been reached in this great endeavor, and as one observer expressed it, that "the tuberculosis death rate cannot be reduced much further under our present methods of control." Myers,[4] whose profound studies of the juvenile form of the disease have inspired many of us, has frequently alluded to such a concept. It would be merely conventional to declare that the mastery of the white plague hinges directly on the prevention of its spread through fresh invasions, and since "the trail of tuberculosis leads back to childhood" that a different pattern of procedure must be employed than we are now practicing among those at the threshold of life. Bruce[5] accurately expresses the situation when he declares that "we must do more than care for the active disease if we wish to accomplish anything in prevention." An attack as specific as that directed against congeneric infections seems imperative; an assault, for example, from an epidemiological

*Read in Clinical Session, Texas Pediatric Society, meeting conjointly with Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

viewpoint which is stressed uniformly in the management of every other major communicable disease of mankind and even of lower animals, but, strangely enough, not emphasized here in keeping with its importance. Some of the most elementary principles of suppression are found absent in many otherwise excellent campaigns against this ubiquitous foe, although the communicability of tuberculosis was recognized by the Greeks and the Romans and the belief perpetuated by Spanish and Italian physicians down to modern times. Myers[6] informs us that in 1781 compulsory reporting was required in Italy and that ordinances of that period called for "the destruction of contaminated articles, the replastering of the house from cellar to garret, removal of the sick to hospitals," and, in short, the exhibition of sanitary measures as complete as the limited knowledge of the day permitted. Leprosy, once almost as common as tuberculosis, has been expelled from the civilized world by just such measures.

Present day measures for control and eradication may here be briefly enumerated:

(1) The development of organized agencies, national, state and local.

(2) The segregation of active cases in sanitoria or hospitals.

(3) The protection of the food supply, including the testing of cattle, the pasteurization of milk, the inspection of meat, the examination of food handlers, and the screening of foods exposed for sale.

(4) Examination of school children, including not only the physical survey but the use of intradermal tests, the x-ray, and particularly a follow-up in the homes of those found to be infected; the plan perfected by Chadwick in Massachusetts and adopted practically everywhere in greater or lesser degree throughout the United States. These investigations have revealed, as nothing else could, the direct relation between the first, or primary infection and the adult form of tuberculosis.

(5) Closely associated with this great movement we note the evolution of the open air or sun school, summer camps, the preventorium, and the general employment, in the physical training of grade classes, of breathing exercises directed toward more complete expansion of the lungs.

(6) A natural corollary of such protective measures among the young is the educational campaign carried out by official and social groups for the information of parents and guardians; while this vital activity is advancing in ever-increasing volume, it frequently lacks the direct appeal necessary to produce cooperation. Adult health education of the proper sort is still in its infancy.

The vast program embodied in the foregoing summation of repressive operations has, as we all realize, been thus far ineffective in inhibiting the progress of tuberculosis throughout all strata of society. What further expedients are open to us? Dr. Henry S. Meyer maintains that "to control tuberculosis completely will require strict legislation by which we can force isolation of the active cases with the same respect to the public as that by which we control leprosy and other dangerous infections." We are agreed that the prevention of the disease in childhood depends entirely almost on freedom from contact with infected adults; we know that tuberculosis is essentially a family disease and, as Opie reports, that "infection occurs in 80 per cent of the children in families having an active case." It may be apropos here to recall the well-founded indictment against those in the household, the old man or the old woman, with a chronic cough! And we naturally inquire why one formidable disease should be universally ignored, so far as its potentialities for evil are concerned, and others bear the full brunt of official regulation, designed to stop infection at its source. Compulsory legislation, therefore, seems inevitable.

"Notwithstanding the fact that the dangers of continued massive infection are thoroughly realized, Chicago is, as far as we know, the only city or community in the world that legally enforces protection of the children and compels isolation of the non-cooperative case. It is unlawful for the open case to reside in the same home with children; either the tuberculous individual or the child must leave the home."[8]

This, of course, strikes the keynote of prevention. An immense program of education and publicity will be required to popularize such measures. In reviewing enactments of this nature in the United States, Plunkett[8] reports that

14 states and one territory authorize the forcible removal from their homes of dangerous cases of tuberculosis to suitable institutions and their detention therein, but the execution of these laws is limited in eight states and rarely enforced in six. In addition, 13 states have no public sanitoria, although most of our commonwealths have a few county hospitals devoted to this purpose. Hasseltine[9] has shown that where infants of leprous mothers are removed to clean surroundings immediately after birth practically none acquires the disease and Hollman,[10] with many other writers, has clearly demonstrated the relation of environment to heredity in this grave infection. The well-known plan of Grancher for the placement of infants and children living with open cases would seem a logical solution of the problem where hospital facilities are not available. Texas has a similar method which seems to have satisfied these demands most admirably. Where some arrangement of this character is not permissible, from whatever cause, the Calmette immunization should be employed. No fair minded physician can follow the extensive reports now available, dealing with BCG inoculation, without reaching the profound conviction that we have at last found a safe, inexpensive and readily available agent for the protection of infants forced to live in a contaminated environment. Practically all of the original objections to this inoculation have been ruled out by the findings of clinicians in every part of the world, including those of Park, Kereszturi, Overton, Casparis, and Childs, of the United States.

In the final analysis the eradication of tuberculosis remains perhaps more in the hands of the general practitioner, commonly believed to belong to an extinct species, but whom I find is happily as fully alive and omnipresent as ever.

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PERIODIC HEALTH EXAMINATIONS FOR CHILDREN*

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During the last two decades much has been said and written about periodic health examinations for adults. The larger life insurance companies have been leaders in furthering this propaganda, for it is self-evident that the better the general health of their policyholders, the earlier their beginning pathological conditions are discovered, and the longer their policyholders live, the more successful financially will be the insurance companies.

In 1915, the Metropolitan Life Insurance Company of New York arranged with the Life Extension Institute to give periodic health examinations to a group of 6,000 policyholders. Five years later, in 1920, the results were summarized. It was found that 217 of the originally examined policyholders had died, compared with an expected 303 deaths during the same period, or only 72 per cent of the expected mortality. This was a saving of 28 per cent on the mortality according to the American Men Table, which approximates the experiences of most ordinary life companies.

In order to check these figures further a comparison was then made with the results obtained with the whole body of ordinary policyholders who had been insured prior to 1915, and it was found that the group periodically examined showed a saving of 24 per cent on the mortality. Furthermore, judged strictly from the economic standpoint, the company found that for every dollar spent in making this study it had saved two dollars by lessening the mortality in the group.

In the light of these figures is it unreasonable to expect that there should be an appreciable saving in the mortality, and especially in the morbidity of children as a result of periodic health examinations arranged especially for them? Therefore, as a possible backlog to stabilize a pediatric practice we have found a considerable percentage of the parents of our patients already educated to the idea of periodic health examinations, and many of them willing

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to pay a reasonable fee for the health protection such examinations afford to their children.

All physicians know that the general health of an adult, barring accidents and surgical operations, is influenced by the sum total of the following factors: (1) hereditary traits or family constitution; (2) the mother's health before and while carrying the baby, and (3) the general health of the child from birth up through adolescence to adult life.

We cannot change hereditary traits in those already born; all we can hope to do is to modify them favorably by proper environmental conditions. Since factor number two, the mother's health, can be influenced only by proper prenatal care and supervision of the mother during pregnancy, which duty belongs in the domain of the general practitioner and the obstetrician, and since this is a pediatric presentation our observations and suggestions will be limited to the third factor, that is, the general health of the child.

CARE OF THE NEW BORN

Medical supervision of the child from birth should be assumed by the trained pediatrician or at least by the general practitioner with special pediatric training. Thus, the new born infant becomes, as he naturally should, a pediatric patient and his future welfare should be considered from that standpoint.

Perhaps one may be criticized by interjecting at this time an impression gained from the results of the survey of Denver's Maternal and Infant Mortality Rates, namely, (1) that if the general practitioner, the internist and the obstetrician would give more attention to the mother's condition before she becomes pregnant, during pregnancy, and while in labor, and (2) if they would turn the new born infant over to the pediatrician, who is better trained in infant feeding and the general care of the child, not only would the maternal, fetal and new born mortality rates be very materially decreased, but also the infant mortality rates, which, as you know, include deaths up to one year of age.

As a natural result of the combined decrease of all these rates the average tenure of life would be proportionately increased, and with more mothers surviving to nurse and to care for their babies we should have healthier children, and adults more resistant to infections.

THE FIRST YEAR

The following plan of starting routine medical care of the child from birth to adolescence is suggested as a possible ideal.

The new born infant should be thoroughly examined as soon as possible after birth, congenital defects noted, and temporary conditions remedied. Every baby should be put to its mother's breast except when the mother has an open tuberculosis or some other equally definite contraindication to nursing.

After lactation has been well established the baby should be brought to the pediatrician for its first periodic health examination, then once a month for the first six months, and then every two months until one year old. Each time the baby should be given a thorough physical examination, feeding should be regulated, and the accumulated questions of the more or less anxious mother answered from the list which she is always requested to bring with her.

Some time during the first six months, and preferably before the third month the baby's urine should be examined, a full blood count made, including hemoglobin, red, white, and differential counts, coagulation and bleeding times; also a tuberculin skin test, and where the equipment is available an x-ray of the chest. About six months later the hemoglobin and urine tests should be repeated, and where possible contact may have occurred during the interval the tuberculin skin test should also be repeated. We routinely use the Craig or Mantoux tests, or both.

Before the end of the first year the baby should be vaccinated against smallpox and immunized against diphtheria. As soon as they are definitely proven to be effective and harmless to the child we should add immunization against whooping cough and scarlet fever, and in time probably tuberculosis.

We believe that at the present time the best immunization against measles is sought during an epidemic by injecting convalescent serum about five days after exposure to infection, with the intention of giving the child a modified form of measles. This procedure has proven very

satisfactory in our practice. Where it is advisable entirely to prevent a measles infection convalescent measles serum, like diphtheria antitoxin, should be given immediately after exposure to infection and in large amounts. This latter procedure, as in diphtheria, of course gives only temporary immunization and does not protect the child in a subsequent measles epidemic.

THE SECOND YEAR

With the beginning of the second year of life the child should again have a complete physical examination and the full routine laboratory tests already enumerated should be repeated. In the second year the child should be seen every three months for physical, mental and dietary supervision, and during the year should have another x-ray of the chest, and, if indicated, of the sinuses, as well.

Before the end of the year there should be an additional urinalysis and hemoglobin test, and if the child has not already been immunized against smallpox and diphtheria this should be done as soon as possible.

THE PRESCHOOL AGE

This age includes children from two to six years, and these children should be examined semi-annually.

Adhering to the ideal plan with which we started, these children should have each year a complete physical examination: x-rays of the chest and sinuses, a tuberculin skin test, full routine laboratory tests, and an additional urinalysis and hemoglobin test later in the year.

Again, if the child has not been immunized against smallpox and diphtheria this should be done as early as possible in the preschool age.

At this age, and especially as the child gets older, particular attention should be paid to faulty posture, and where it exists corrective exercises should be instituted. Yearly photographs of the child are often helpful, especially in showing beginning faulty body mechanics.

THE SCHOOL AGE

These children should be examined at least once a year, better semi-annually, close to their birthday and again about six months later. Under our ideal plan children of school age should each year have the same complete examination, x-rays and full laboratory tests, as those recommended for the child of preschool age, but in any case should have at least one urinalysis, hemoglobin and tuberculin skin test during the year.

ADOLESCENCE

Particularly in the child who has had pediatric supervision from birth up to puberty much could be said in favor of continuing this supervision through adolescence.

Certainly no one is better prepared to supervise the health and activities of the growing child through these trying years of maturity than the physician who following our plan has guided the growth and the development of the child from birth.

PEDIATRIC PRACTICE

To reiterate a rather trite saying that "A pediatrician is a general practitioner with an age limit," one often pauses to wonder why there necessarily should be an arbitrary age limit in private pediatric practice.

Such an age limit is of course necessary in a general hospital in order definitely to allocate the cases admitted, but why, after all, in private practice might not the continuation of pediatric supervision be left to the wishes of the maturing children and their parents, and not to the general practitioner and internist, many of whom believe that the pediatrician should be in fact just "a baby specialist."

Every pediatrician who has been in practice over a long period of years knows that sooner or later every child as he or she matures rebels at the thought of being taken to see "a child specialist," and in this way this part of his practice gradually drifts away from him.

In conclusion a summary of the ideal plan of periodic health examinations, as outlined above, is given in graphic form, together with some alternate plans which we have found better fitted to those whose economic circumstances will not permit of the ideal plan.

FIRST YEAR

Plan 1
Ten office examinations
X-ray of the chest
Full routine laboratory tests
One additional urine and hemoglobin test
Immunization against diphtheria and smallpox

Plan 2
Same as Plan 1, omitting x-ray and full laboratory
One urine, hemoglobin and tuberculin test

Plan 3
Nine office examinations
One urine, hemoglobin and tuberculin test
Patient saves 20 to 30 per cent

SECOND YEAR

Plan 4
Four office examinations
X-ray of the chest
Dental examination
Full routine laboratory tests
One additional urine and hemoglobin test

Plan 5
Same as Plan 4, omitting the x-ray

Plan 6
Four office examinations
Dental examination
One urine, hemoglobin and tuberculin test
Patient saves 30 to 35 per cent

PRESCHOOL AGE

Plan 7
Two office examinations
X-ray of the chest and sinuses
Dental examination
Full routine laboratory tests
One additional urine and hemoglobin test

Plan 8
Same as Plan 7, omitting the x-rays

Plan 9
Two office examinations
One dental examination
One urine, hemoglobin and tuberculin test
Patient saves 40 per cent

SCHOOL AGE

Plan 10
Complete physical examination annually
Dental examination
One urine, hemoglobin and tuberculin test
Patient saves 40 per cent

If indicated, x-rays of the chest and sinuses, basal metabolism test and allergic skin tests will be made at a minimum additional cost; also immunizations if not already done.

It is my hope that these plans will be of interest and prove helpful to all physicians with a pediatric practice and thus keep this important phase of work with children where it belongs under the supervision of the well trained medical practitioner, and not left too much in the hands of lay and philanthropic organizations, and, lastly, not to the health departments of our public schools.

The responsibility definitely rests upon the shoulders of the physicians. Are they willing to accept the responsibility and train themselves properly for this special work?

AN ENLARGED NURSING PROGRAM IN THE STATE BOARD OF HEALTH AND THE TREND IN MATERNAL MORTALITY*

By HENRY HANSON, M.D.,†
Jacksonville, Florida

The present enlarged nursing program of the State Board of Health is the result of a conference, on November 2, 1933, of the State Emergency Relief Administrator, Mr. Marcus C. Fagg, a committee from the State Nurses Association, and the State Health Officer. It was the desire of the Relief Administration to provide nursing care for relief clients. How best to accomplish this was the object of the conference, and the conclusion was reached that all such nursing activities should be under professional supervision. It was agreed that the State Board of Health was the organization best equipped to render such supervision.

The result of a nursing program of this sort was to be two-fold, inasmuch as the nursing personnel was to be recruited from the unemployed nurses throughout the state, and the services which they would perform were to be of benefit to the unemployed population on the relief rolls. Many phases of the problem were discussed at the conference; rates of pay, the classification of nurses, the role of the practical nurse, and who or what organization was to certify the nurses chosen. The recommendations of the National Organization for Public Health Nursing as to rates of pay and other matters were closely followed in the program proposed for Florida.

The suggestions and recommendations of the November conference met with the hearty approval of the Federal Relief Administrator, who in turn referred the matter to the State Social Service Director, Mr. Walter Wilbur. Mr. Wilbur saw in the proposed plan an opportunity to render a large service, not only to the people on the relief rolls, but to the state as a whole. Through his efforts the nursing program was set up as a state nursing project, under the supervision of the State Health Officer.

In final form the project consisted of the State Health Officer as executive officer, the

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†State Health Officer.

chief nurse of the State Board of Health as director of the nursing activity, a maximum of 275 nurses, and a small clerical staff. Graduate registered nurses were given first consideration for employment, and the practical nurses classified as nurses' aids, receiving a lower rate of pay. The nurses were assigned to county health units, cities, hospitals, and so on, and the program specified that they were to do generalized nursing service. This decision has been adhered to, in spite of many requests from persons interested in special activities. All organizations, local, county, state or federal, which wished to have nurses directly assigned and under their special supervision, have been advised that aid would be given by the state nursing project under the supervision of the State Board of Health. In this way the work has moved forward consistently and without duplication of effort.

As a preliminary step to the establishment of the enlarged nursing program there was selected from among those taken on the rolls a group of nurses with previous public health experience or previous executive experience, to act as district supervisors. This group was brought to the headquarters of the State Board of Health for preparatory instruction. The instructors were the regular staff nurses of the State Board of Health. During this period each bureau head of the State Board of Health talked to the nurses about the various phases and activities of their respective bureaus, and explained the correlation of the work of the State Board of Health and the medical and social services. At the conclusion of this period of instruction the nurses were assigned to districts and sent out to assist in their organization. There were 13 such districts, comprising the state as a whole.

As a second preliminary step the enrolled nurses from each district were brought together in several regional conferences, at which time the State Board of Health staff nurses and the district supervisors instructed and advised with them as to the policies and intent of the project.

At no time did the Nursing Project enter any district without the approval of the local county medical society.

NURSING PROJECT IN RELATION TO MATERNAL MORTALITY

The maternal mortality rate in Florida is among the highest in the United States. The fact that a large proportion of the population is attended at delivery by untrained midwives, and has practically no prenatal care, is thought to be in large measure responsible for this high rate.

Up to the year 1931 Florida had no legal control of midwives. The legislature of that year passed a law authorizing the State Board of Health to license and register all midwives. This law has been of use, and through it we have been able to obtain a measure of control of this class. Unfortunately, the law contained no penalty clause for those midwives who persisted in practicing without a license. A substitute bill was introduced in the 1933 legislature, but due to the overcrowding of the calendar in the last days of the session, it died in the house after having passed in the senate. However, we have found that a measure of supervision can be maintained over the midwives if we are able to contact them. In August, 1933, the first Institute for Midwives was held in Tallahassee. The Institute was held for one week, during which time the midwives in attendance were instructed in the elementary principles of midwifery. The need for prenatal care was stressed and the necessity for bringing their clients to a physician for examination. Four of these Institutes have been held in various sections of the state since that time. Two have been held since the establishment of the FERA Nursing Project, at which times the FERA nurses attended, also, receiving instructions in midwifery and in the methods of deal-

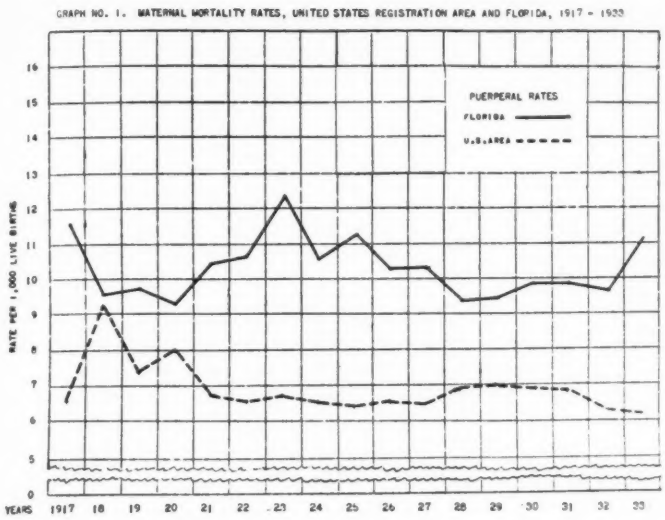
Table 1

MATERNAL MORTALITY, 1923-1933

	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934 8 mos.
Totals	287	284	330	357	352	280	255	267	267	262	285	126*
Rate	12.4	10.6	11.3	10.3	10.3	9.4	9.5	9.9	9.9	9.6	11.1	8.16*
White totals	164	138	186	214	202	175	144	155	142	149		
White rate	10.5	7.6	9.3	8.6	8.5	8.5	7.9	8.3	7.6	7.9	8.7	
Negro totals	123	146	144	143	150	105	111	112	125	113		
Negro rate	16.2	16.9	15.6	14.5	14.7	11.5	13.0	13.3	14.9	13.2	16.2	

Total number of births in 1933 was 25,681.
Total number of births first 8 months in 1934 was 15,426

*Provisional figures.


GRAPH NO. 1. MATERNAL MORTALITY RATES, UNITED STATES REGISTRATION AREA AND FLORIDA, 1917 - 1933
PUERPERAL RATES
FLORIDA
U.S. AREA
RATE PER 1,000 LIVE BIRTHS
YEARS
1917 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33

ing with the midwives in their particular districts. We feel that these Institutes will play an important part in the eventual lowering of the maternal mortality rate, and that they have already had some effect. With the larger number of nurses at our command, we have been able to make personal contacts with the midwives. Also, during 1934 there has been more medical and nursing service for the very poor and the class which formerly was dependent almost entirely on the midwives for obstetrical care. The nurses have given a considerable amount of prenatal attention and service, and have brought many women to the physician for examination. Through the nursing service more midwives have been taught to bring their clients to a physician for prenatal examination. Blood pressure, urinalysis, samples of blood for Kahn or Wassermann tests have been taken.

The foregoing account has been given merely to suggest that the apparent trend toward a lower maternal mortality rate in Florida may be due in some measure to the factors mentioned, namely: the administration of the 1931 midwife law, and the enlarged nursing program. An analysis of the 1934 figures seems to indicate that this might be the case.

The first table which accompanies this paper shows the maternal mortality for the 11 years preceding 1934, and for the first eight months of 1934. It will be seen that the rate for the whole population varies from 9.5 to 12.4 per 1,000 live births. For the white population the rate varies from 7.6 to 10.5 per 1,000 live births, and for the negro population from 11.5 to 16.9 per 1,000 live births. The maternal mortality rate for the whole population for the year 1933 was 11.1, while the rate for the white race was 8.7, and for the negro 16.2. The combined rate for the first eight months of 1934 is just below 8.2, a drop of nearly 3 per 1,000 live births.

Graph 1 shows the trend in maternal mortality rates for the years 1917 to 1932, comparing the Florida rate with that of the U. S. Registration Area.

The second table shows the percentage of births, by color, and whether attended by physician or midwife, for the years 1929 to 1932, inclusive. It shows that approximately one-third of the mothers were attended by midwives. Although the mortality in the practice of midwives appears to be lower than the mortality in the group attended by physicians, a further study tends to show that many of the fatal cases were first attended by midwives, who, when in difficulty, referred the case to a physician, who was often called too late to do anything except sign the death certificate.

Table 2

PERCENTAGE OF BIRTHS, BY COLOR, AND ATTENDED BY DOCTORS AND MIDWIVES, FLORIDA, 1929-1932

	1929		1930		1931		1932	
	Per Cent Attended by		Per Cent Attended by		Per Cent Attended by		Per Cent Attended by	
	Drs.	Mid.	Drs.	Mid.	Drs.	Mid.	Drs.	Mid.
STATE	65	34	67	32	66	33	66	33
White	87	12	88	11	87	12	86	13
Colored	19	81	20	79	19	80	21	78

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RADIATION IN PREGNANCY

Proper therapeutic use of the x-ray depends upon an intimate knowledge of the susceptibility of different kinds of tissue. The reaction of a given type of cell to the x-ray is so characteristic that a classification of tumors has been suggested, which is to depend not upon the appearance of tumor cells to the pathologist, but upon their reaction to radiation.

Rapidly growing tissues are of course particularly vulnerable. Therapeutic radiation during pregnancy has long been considered dangerous, because of the possibility of injury to the fetus. Murphy,[1] of the University of Pennsylvania, in studying a series of women radiated for various reasons during pregnancy, who subsequently bore children, reported a comparatively high incidence of microcephaly and lesions of the central nervous system. Among defects which occurred in his series were hydrocephalus, Mongolian idiocy, blindness, spina bifida, and other deformities.

Job, Leibold and Fitzmaurice[2] have attempted to discover by studies of small mammals (rats) whether there is a critical period of susceptibility, and whether a particular injury may be related to a definite time of fetal development. The rat embryo, according to these authors, appears in the horn of the uterus four and a half to five days after insemination. Implantation in the walls of the uterus occurs at about the seventh day, that is, a week after insemination. By the latter half of the ninth day all three germ layers are present. The effects of a quantity of x-ray smaller than the erythema dose were observed at different stages of development: (1) before insemination; (2) at the time between fertilization and attachment to the uterine walls; (3) at the period of organ formation and (4) at the time of rapid growth and early functional development. These periods came between the first and eighteenth days of gestation.

Radiation before insemination did not result in defective offspring. Radiation just after insemination induced abortion in a large number of instances; however, 97 young were obtained from animals irradiated with 20-80 r between the eighth and eleventh days of gestation, or just after implantation of the fetus in the uterine wall. Half of these offspring were abnormal and defects of one or both eyes made up more than half of the abnormalities. About a third were hydrocephalic and a fifth had jaw defects. The males were more susceptible to all injuries. The authors believe this is because the male in the early period develops faster than the female.

An experiment was undertaken to ascertain the effect of screening the upper half of the body from the x-ray, to protect the sensitive head and brain and irradiate only the caudal half. No gross defects resulted in these animals, but there was a decided change in the sex ratio. More males developed.

The authors conclude that in rats a dosage of 95 to 200 r of x-ray between the first and eighteenth days of gestation will kill all conceptus, and 100 r in later pregnancy will cause abnormalities. Thirty-five to 90 r on the ninth to the eleventh day of gestation, the period of organogenesis, produces gross developmental defects in the offspring. Particular injuries resulted from radiation on definite days of development. The brain defect was produced by treatment on the ninth day; the eye defect on the tenth; the jaw defect on the eleventh. A small dosage, 35-50 r between the ninth and eleventh day, disturbed the sex ratio, resulting

1. Murphy, Douglas P.: Outcome of 625 Pregnancies in Women Subjected to Pelvic Radium or Roentgen Irradiation. Amer. Jour. Obst. & Gyn., **18**:179, 1929. Editorial, Radium and X-Ray in Pregnancy. Sou. Med. Jour., **18**:945, 1929.

2. Job, Thesle T.; Leibold, George J., Jr.; and Fitzmaurice, H. A.: Biological Effects of Roentgen Rays. Determination of Critical Periods in Mammalian Development with X-Rays. Amer. Jour. Anat., **56**:77, Jan. 15, 1935.

in a much higher proportion of male animals, and this group furnished most of the defectives.

The belief is current that sex of the embryo is determined at the time of fertilization. Studies of cell division describe sex as depending upon the presence or absence of a sex chromosome at the time of the first division of the fertilized egg. The report from Loyola University of an increase of male births following radiation between the ninth and eleventh days of gestation suggests the possibility that other and outside influences comparatively late in the development of the mammalian fetus may modify its sex.

Clinically, the conclusions of earlier workers as to the dangers of therapeutic radiation during pregnancy are confirmed and elucidated by the experimental studies. Radiation in the absence of pregnancy results usually in a period of sterility, after which gestation may be entered upon without expectation of defective offspring. Radiation may be used during pregnancy to induce abortion. If a pregnant woman is radiated, abortion should always be secured, since a fetus which survives is very apt to be defective. Microcephalus, hydrocephalus, eye defects and gross deformities were noted by Murphy among the offspring of radiated pregnant women. Experimental hydrocephalus, eye defects and gross deformities, according to the Loyola investigators, result from a particular x-ray dosage at a definite period of embryonal development. Their observations are of significance in the study of the etiology of hydrocephalus and other congenital deformities.

POLIOMYELITIS VACCINE

There has been very great recent activity in the development of vaccines against diseases hitherto not considered preventable. It may be well to consider the nature of some of the bacterial products recently injected into human beings for the purpose of immunization.

The simplest vaccine is of course the heat killed bacterium, as used, for example, in the prevention of typhoid fever. Many bacteria and bacterial toxins lose their antigenic effect after heating and do not stimulate the production of antibodies, or after heating are still too toxic for injection. For prevention of diphtheria up to a few years ago, it was necessary to inject bacterial toxin into a horse, then use the horse immune serum with a small quantity of diphtheria toxin for injection into human beings for preventive inoculation. Lately it has been shown that a toxoid, that is, a formaldehyde treated toxin, may be used for immunization, and this makes a much simpler preventive agent. A formaldehyde treated tetanus toxoid[1] is said to have considerable preventive value. Tetanus is another of the diseases against which only a specific antiserum was believed to be effective. In the case of yellow fever,[2] a virus-antitoxin mixture has been offered and is in some use, and no simpler immunizing agent has as yet been discovered.

For many years heat killed suspensions of the Bordet-Gengou bacillus were used for preventive inoculations against whooping cough. These were abandoned as ineffective and more recently other vaccines have been offered for this disease. One is an unheated suspension of the organism which has stood with a very small amount of carbolic acid; the other is a filtrate of the same Bordet-Gengou bacilli after they have been individually crushed and disintegrated by a machine made for the purpose.[3]

Vaccines have been prepared against certain staphylococci and streptococci by lysing or dissolving the particular micro-organism with a specific bacteriophage and filtering the lysed culture. Vaccines have been prepared by treatment with sodium ricinoleate. The principal of all methods is to render a dangerous micro-organism or toxin harmless, while altering it as little as possible.

Two new methods of prevention of poliomyelitis have been described by immunologists of distinction. Maurice Brodie,[4] of New York City, describes a vaccine made by treating the filtrate of infected spinal cords with dilute formalin. The product thus should resemble the diphtheria toxoid which has now been widely used, but it is potentially more dangerous since a living virus is treated with the antiseptic, instead of a toxic filtrate. Brodie has injected it in animals and in children. John A. Kolmer,[5] of the University of Pennsylvania, describes the use of a poliomyelitis virus treated with sodium

1. Editorial, Immunization Against Tetanus. Sou. Med. Jour., **27**:884, Oct., 1934.

2. Editorial, Modern Work on Yellow Fever. Sou. Med. Jour., **28**:76, Jan., 1935.

3. Editorial, Prevention of Whooping Cough. Sou. Med. Jour., **27**:817, Sept., 1934.

4. Brodie, Maurice: Active Immunization of Children Against Poliomyelitis with Formalin Inactivated Virus Suspension. Proc. Soc. Exper. Biol. & Med., **32**:300, Nov., 1934.

5. Kolmer, John M.: and Rule, Anna M.: Concerning the Vaccination of Monkeys Against Acute Anterior Poliomyelitis. Jour. Immunol., **26**:505, June, 1934. Kolmer, J. A.: and Klugh, G. F.: A Successful Method for Vaccination Against Acute Anterior Poliomyelitis. J.A.M.A., **104**:456, Feb. 9, 1935.

ricinoleate, which was given to animals and adults and children without ill effects.

The discovery of means of prevention of contagious diseases must still depend upon the trial and error method, and upon use of a given product in a large number of cases. Time and extensive trial will be necessary for evaluation of the methods of vaccination against infantile paralysis, and time will doubtless further improve them. It is a triumph of bacteriological methods that contagious diseases hitherto refractory are apparently yielding to specific inoculation.

GLEANINGS FROM RECENT JOURNALS

Nerve Changes in Diabetes.—Neurological symptoms complicate a large number of chronic diseases in which the primary pathologic disturbance is elsewhere. In pellagra, pernicious anemia, syphilis, even such an intestinal infection as typhoid fever, neurological changes are noted and necropsy reports describe typical changes in the appearance of the nervous tissues.

Fifty per cent of diabetics are said to show evidence of a disturbed nervous system. Chemical analysis of diabetic nerves and comparison with non-diabetic, according to Jordan, Randall and Bloor,[1] of the University of Rochester, shows changes in some of the main constituents. Diabetic nerves gave lower values for phospholipids, cerebrosides and cholesterol, three complex fatty substances.

These are usually abundant in nervous tissue. The first is a phosphorus-fat-nitrogen compound; the second a phosphorus-free, fat-sugar compound characteristic of brain and nervous tissue; the third a phosphorus-and-nitrogen-free, fat-like substance abundant in the white matter of nerves, and to be found in all animal cells and liquids. Chemical changes in diseased tissue are usually described later than histologic changes. A decrease in nerve fats is here demonstrated, in a disease of carbohydrate metabolism.

A Test for Psittacosis.—It used to be taught medical students, "In case of obscure fever, think of syphilis, tuberculosis, typhoid fever, pneumonia."

Through the tremendous activity of bacteriological investigators, of late years, the number of possible conceivable causes of a continued fever has been very greatly increased: tularemia, Malta fever, Rocky Mountain spotted fever, psittacosis, and other diseases formerly considered very rare, have been shown to be much more common than was believed. The problem of differential diagnosis becomes increasingly difficult, even if a well equipped laboratory is at the service of the diagnostician. Some of these are particularly dangerous for laboratory workers to handle and cases of accidental infection in the laboratory are rather frequently reported.

Psittacosis, the disease carried by parrots, has in particular been difficult to diagnose accurately. It closely resembles pneumonia. Serological tests do not give accurate information and infected birds are difficult to handle. According to Rivers and Berry,[2] the virus is contained in the sputum, and the disease may be diagnosed by injecting the sputum into the peritoneal cavity of mice, which give a characteristic picture in from five days to two weeks.

Gastric Depressant.—The gastric secretory response of ulcer patients to both alcohol and histamine, according to Nichilis and Meyer,[3] of Chicago, is usually greatly inhibited by the presence of oil of peppermint in the stomach. The same phenomenon is observed in dogs with Pavlov and Heidenhain pouches. The Chicago investigators believe the mechanism is a local effect on the stomach mucosa.

TWENTY-FIVE YEARS AGO

FROM JOURNALS OF 1910

Cause of Cancer.—"With regard to the infectious nature of cancer, when I began to teach the doctrine in this country some twenty years ago, I was smiled at everywhere, and found very few friends of that theory either here or abroad. Yet now the infectivity of cancer is quite generally established. Last year at the meeting of the International Society of Surgeons, held in Brussels, this question was under discussion for three days, and of some three hundred surgeons present . . . I found a large majority . . . believed in the infectivity of cancer, although there are naturally still some doubters. . . . The efficacy of the cathode rays . . . can be enhanced by the use of thyroid extract.[4]"

1. Jordan, W. R.; Randall, Lowell O.; and Bloor, W. R.: Neuropathy in Diabetes Mellitus: Lipid Constituents of Nerves Correlated with Clinical Data. Arch. Int. Med., **55**:26, Jan., 1935.

2. Rivers, T. M.; and Berry, G. P.: Diagnosis of Psittacosis in Man by Means of Injections of Sputum into White Mice. Jour. Exper. Med., **61**:205, Feb., 1935.

3. Nichilis, H.; and Meyer, Jacob: On the Inhibition of Gastric Secretion by Oil of Peppermint. Amer. Jour. Physiol., **110**:686, Jan., 1935.

4. Park, Roswell: The Cancer Problem. Sou. Med. Jour., **3**: 153, 1910.

Influenza.[1]—"Influenza, or la grippe, is in some respects a remarkable disease, for its spread through a territory is so marvelously rapid that it is not easy to account for it. In these days of steam travel it is easy to attribute it accordingly, but 400 years ago it spread with such rapidity that as one author described it, 'London went to bed well and awoke coughing and sneezing.' * * * The bacillus which causes it is a pigmy among bacilli, and it is endemic all over the world, occasionally blazing up into widespread pendemics from whose attacks few escape. * * * Hypochondria and an impulse to suicide may result when the nervous system is attacked. * * * Let us consider the therapeutics required. The following principle may be laid down as demonstrated, which is: every day the sufferer struggles against the disease and refuses to go to bed, will cost him two days in bed when the inevitable surrender comes. * * *

"Experience has taught most practitioners that, if they meet the onset with the same parasiticidal treatment that they give bad cases of malaria, they will moderate the attack. * * * For an adult such a plan of treatment would call for 20 grains of calomel and 15 grains of Dover's powder divided into four doses, one to be given every two hours. One hour after each dose five grains of quinine are given."

Editor Under Fire.[2]—A resolution was passed by the Council of the Chicago Medical Society condemning Dr. George H. Simmons and taking steps to oust him from his position as Editor and Secretary of the American Medical Association.

1. Moody, H. A.: Suggestions in Therapeutics. Gulf States Med. & Surg. Jour., **16**:236, 1910.
2. Lingenfelder, Walter: J.A.M.A., **54**:629, 1910.

Book Reviews

Benign Encapsulated Tumors in the Lateral Ventricles of the Brain: Diagnosis and Treatment. By Walter E. Dandy, M.D., Adjunct Professor of Surgery, Johns Hopkins University. 189 pages, illustrated. Baltimore: The Williams & Wilkins Company, 1934. Cloth, $4.50.

Dandy's latest monograph on the tumors of the lateral ventricles is presented in his usual very comprehensive style. In view of this author's extensive experience in what is now probably the outstanding neurosurgical clinic in the world, anything that he publishes commands the respectful attention of the profession generally and of those interested in neurosurgery in particular.

While the small, non-symptom producing and malignant tumors are briefly described, the major portion of the book is devoted to a discussion of the pathology and diagnosis of the larger encapsulated tumors causing symptoms, the basis of the discussion being fifteen verified cases presented in detail and twenty-five collected from the literature. The fact is developed that these tumors do not produce a definite syndrome by which they can be definitely localized, but that all lateral ventricle tumors can be localized with precision by ventriculography. Dandy emphasizes again that this procedure, when properly utilized, is without risk; a statement at variance with the observations of Francis Grant, who found a mortality rate somewhat over 8 per cent from the remaining neurosurgical clinics in this country. It is difficult to correlate these divergent observations of two good neurosurgeons.

An analysis and summary of the signs and symptoms follows the presentation of cases and a brief description of the operative approach. The tremendous advances in neurosurgical technic are reflected in the mortality rate in this group, there being only three deaths in the entire series and only one in the last seven cases. In the twelve living patients there has been no sign of recurrence, but the warning is given that much additional time will be necessary to deny this possibility.

The illustrations are numerous and of the usual excellence emanating from this clinic.

This monograph is certainly a worthy twin of the "Tumors of the Third Ventricle" brought out a year ago by the same author, and is one that every one interested in neurosurgery will want on his shelves.

Collens' System of Diet Writing. Including: Diet Calculator, Obesity Chart, 100 Menu Prescription Forms. By William S. Collens, B.S., M.D., Brooklyn, New York, Chief, Diabetic Clinic, Israel Zion Hospital. New York: Form Publishing Company, 1934. Cloth, $5.00.

So many inadequate and fallacious short cuts for calculating diets have been exploited in medical circles that the clinician who sees a new one usually is skeptical of its practicability. Usually the systems, or the charts, for calculating the carbohydrate, protein and fat content of various diets are confusing; but not so with Collens' "System of Diet Writing." The Collens' "diet calculator," consisting of cardboard revolving discs with many diets of varied food content printed on them, enables one in a moment to determine the amounts in grams of vegetables with 5, 10, 15 and 20 per cent content, and the number of grams of bread, meat, fats, *et cetera*, needed for almost any combination of carbohydrates, proteins, and fats. The system will lessen the work of any clinician who has to calculate daily menus for patients with diabetes mellitus, hyperinsulinism, obesity, epilepsy, nephrosis, and other conditions in which scientific dieting is indicated. The Collens' "System of Diet Writing" can be learned in a few minutes by any clinician or dietitian who has a working knowledge of the arithmetic of nutrition.

The diet blanks are practical and well arranged, though it is evident that the author is not familiar with the physiological effects of caffeine, since he has printed on each diet sheet the following: "Coffee and tea are allowed with all meals." The reviewer cannot agree with the author regarding a few of his diets, though in the main they are good. For instance, the Sippy ulcer diet is not so good as the original Lenharz ulcer diet, of which it is a modification; nor is the author's dietary management after gastric operations to be commended. The fact is that routine, or stock, diets for peptic ulcer, or for any other conditions, to say the least of them, are not scientific. Each diet for any condition should be calculated to suit the nutritional needs of the individual under treatment, and not to make the patient fit any routine diet.

Southern Medical News

ALABAMA

The Madison County Medical Society elected the following officers for the coming year: Dr. C. A. Grote, Huntsville, President; Dr. M. M. Duncan, Huntsville, Vice-President; Dr. J. S. Crutcher, Huntsville, Secretary-Treasurer.

The Tuscaloosa County Medical Society elected the following officers for the coming year: Dr. Stuart Graves, University, President; Dr. Charles Abbott, Tuscaloosa, Vice-President; Dr. Peabody Mayfield, Tuscaloosa, Secretary-Treasurer.

The Talladega County Medical Society had as speakers at their annual Home Coming meeting Dr. H. Earle Conwell, Birmingham, and Dr. Fred Wilkerson, Montgomery.

Dr. Chalmers H. Moore, Birmingham, has recently returned after spending nearly a year at the Neuro-Surgery Clinic of the New York Postgraduate Hospital and at the University of Pennsylvania.

Deaths

Dr. William James Hagan, Athens, aged 72, died January 1 of pneumonia.

Dr. William Henry Crook, New Brockton, aged 88, died in December of fracture of the femur.

ARKANSAS

The Saline County Medical Society elected the following officers for the coming year: Dr. E. A. Buckley, Bauxite, President; Dr. T. C. Watson, Benton, Vice-President; Dr. C. W. Jones, Benton, Secretary-Treasurer.

The Miller County Medical Society elected the following officers for the coming year: Dr. N. B. Daniel, Texarkana, President; Dr. L. H. Lanier, Texarkana, Vice-President; Dr. B. C. Middleton, Texarkana, Secretary-Treasurer.

The Johnson County Medical Society elected the following officers for the coming year: Dr. J. M. Kolb, Clarksville, President; Dr. G. R. Siegel, Clarksville, Secretary-Treasurer.

The Pulaski County Medical Society elected the following officers for the coming year: Dr. Joe F. Shuffield, Little Rock, President; Dr. E. H. White, Little Rock, Secretary; Dr. R. J. Calcote, Little Rock, Treasurer.

The Conway County Medical Society elected the following officers for the coming year: Dr. J. H. Colay, Jerusalem, President; Dr. A. L. Goatcher, Plumerville, Vice-President; Dr. C. F. Ethridge, Morrilton, Secretary-Treasurer.

The Hempstead County Medical Society elected the following officers for the coming year: Dr. G. E. Cannon, Hope, President; Dr. J. H. Weaver, Hope, Vice-President; Dr. A. C. Kolb, Hope, Secretary-Treasurer.

The Fifth Councilor District Medical Society elected the following officers for the coming year: Dr. J. J. Baker, Magnolia, President; Dr. T. H. Jones, Magnolia, Vice-President; Dr. S. A. Thompson, Camden, Secretary-Treasurer.

The Sevier County Medical Society elected the following officers for the coming year: Dr. I. G. Jones, DeQueen, President; Dr. C. E. Kitchens, DeQueen, Vice-President; Dr. C. C. Hanchey, Little Rock, Secretary-Treasurer.

The Faulkner County Medical Society elected the following officers for the coming year: Dr. J. H. Downs, Vilonia, President; Dr. G. L. Henderson, Conway, Vice-President; Dr. J. S. Westerfield, Conway, Secretary-Treasurer.

The Lawrence County Medical Society elected the following officers for the coming year: Dr. H. R. McCarroll, Walnut Ridge, President; Dr. T. C. Neece, Walnut Ridge, Vice-President; Dr. Charles D. Tibbels, Black Rock, Secretary-Treasurer.

The Woodruff County Medical Society elected the following officers for the coming year: Dr. R. N. Smith, Augusta, President; Dr. J. W. Morris, McCrory, Vice-President; Dr. L. E. Biles, Augusta, Secretary-Treasurer.

The Prairie County Medical Society elected the following officers for the coming year: Dr. W. J. B. Williams, Des Arc, President; Dr. Edward Adams, DeVall's Bluff, Vice-President; Dr. J. C. Gilliam, Des Arc, Secretary-Treasurer.

The Phillips County Medical Society elected the following officers for the coming year: Dr. J. B. Ellis, Helena, President; Dr. H. H. Rightor, Helena, Vice-President; Dr. A. W. Cox, Helena, Secretary-Treasurer.

The Crittenden County Medical Society elected the following officers for the coming year: Dr. T. S. Hare, Crawfordsville, President; Dr. R. H. Ray, Earl, Vice-President; Dr. L. C. McVay, Marion, Secretary-Treasurer.

Dr. H. A. Dishongh, Little Rock, was recently appointed Deputy Coroner for Pulaski County.

Dr. C. A. Henry, Clarendon, was recently appointed Director of the Saline County Health Department to succeed Dr. T. C. Watson, Benton, who will return to private practice.

Dr. James K. Grace has returned to private practice at Belleville, having resigned as Surgeon, C.C.C. Camp, Mount Nebo.

Dr. E. D. McKnight, Brinkley, and Dr. L. D. Duncan, Waldron, were recently reappointed to the State Board of Health for terms of four years.

Dr. W. P. Scarlett, Russellville, is the newly appointed County Health Officer for Monroe County.

Dr. J. Kent Grace, Belleville, is the newly appointed County Health Officer for Yell County.

Dr. W. E. Gray, formerly of Little Rock, has located in Hot Springs National Park, where he will take over the office of the late Dr. W. L. Snider.

Dr. C. D. Winborn, formerly of Dallas, has located at El Dorado, where he will be associated with Dr. J. G. Mitchell.

Deaths

Dr. Herbert Drew Snyder, Little Rock, aged 41, died December 9 of heart disease.

Dr. William Lewis Worthington, Camden, aged 72, died December 23 of heart disease.

Dr. Warren Laws Snider, Hot Springs National Park, aged 56, died in December of heart disease.

Dr. William Hunt Blankenship, Pine Bluff, aged 68, died December 12 of carcinoma of the intestine.

Dr. Frank E. Hurrle, Little Rock, aged 54, died January 14 of injuries sustained in an automobile accident.

DISTRICT OF COLUMBIA

The Washington Institute of Mental Hygiene was addressed recently by Dr. Arthur H. Ruggles, of Providence, Rhode Island.

Dr. William Charles White was recently reelected President of the District Tuberculosis Association.

Deaths

Dr. James Francis Coupal, Washington, aged 50, died January 3 of cerebral hemorrhage.

FLORIDA

The Orange County Medical Society elected the following officers for the coming year: Dr. T. M. Rivers, Kissimmee, President; Dr. W. E. Sinclair, Orlando, Vice-President; Dr. Horace A. Day, Orlando, Treasurer; Dr. J. A. Pines, Orlando, Secretary and Reporter.

The Volusia County Medical Society elected the following officers for the coming year: Dr. G. A. Davis, DeLand, President; Dr. H. W. Henry, New Smyrna, Vice-President; Dr. Hugh Lest, DeLand, Secretary-Treasurer.

The Southeastern Surgical Congress held its first state clinical session at the hospital of Dr. J. C. Patterson at Cuthbert, Georgia, recently, Dr. Gerry R. Holden, Jacksonville, being present and giving a clinical demonstration.

Dr. J. G. Lyerly, whose practice will be limited to neurological surgery, has opened offices in the Medical Arts Building in Jacksonville.

Dr. J. W. Vaughn has opened offices in the Marble Arcade Building in Lakeland.

Deaths

Dr. Cyrus John Strong, Miami, aged 72, died December 19 of intestinal obstruction.

Dr. Lovell Hampton Harrell, Plant City, aged 57, died December 26 of chronic nephritis.

Dr. Frederick Greene Barfield, Jacksonville, aged 61, died December 25 of cerebral hemorrhage, uremia and nephritis.

Dr. Henry Edward Sauer, Miami, aged 66, died December 10.

Dr. L. R. Weeks, Trenton, aged 57, died December 26.

Dr. Gaston Holcombe Edwards, Orlando, aged 59, died December 29.

Continued on page 22

CHRONIC "ILL HEALTH" LAID TO VITAMINE DEFICIENCY at Yale University

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DR. GEO. R. COWGILL says:
Chronic ill health may result from a small shortage of vitamin B; and men need more than women.

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(Jr. A.M.A., Nov. 14, 1931)
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Continued from page 285

GEORGIA

The Bibb County Medical Society elected the following officers for the coming year: Dr. C. Hall Farmer, Macon, President; Dr. Ernest Corn, Macon, Vice-President; Dr. A. P. Evans, Macon, Secretary-Treasurer.

The Emanuel County Medical Society elected the following officers for the coming year: Dr. C. E. Powell, Swainsboro, President; Dr. W. H. Lucas, Stillmore, Vice-President; Dr. R. C. Franklin, Swainsboro, Secretary-Treasurer.

The Fulton County Medical Society elected the following officers for the coming year: Dr. Edgar D. Shanks, Atlanta, President; Dr. Grady E. Clay, Atlanta, President-Elect; Dr. A. O. Linch, Atlanta, Vice-President; Dr. M. T. Harrison, Atlanta, Secretary-Treasurer.

The Georgia Medical Society elected the following officers for the coming year: Dr. M. J. Egan, Savannah, President; Dr. C. F. Holton, Savannah, President-Elect; Dr. Harry M. Kandel, Savannah, Vice-President; Dr. Otto W. Schwalb, Savannah, Secretary-Treasurer.

The Glynn County Medical Society elected the following officers for the coming year: Dr. John W. Simmons, Brunswick, President; Dr. Webb Conn, Brunswick, Vice-President; Dr. T. V. Willis, Brunswick, Secretary-Treasurer.

The Habersham County Medical Society elected the following officers for the coming year: Dr. Fred C. Whelchel, Alto, President; Dr. T. B. Brabson, Cornelia, Vice-President; Dr. O. N. Harden, Cornelia, Secretary-Treasurer.

The Jenkins County Medical Society elected the following officers for the coming year: Dr. H. G. Lee, Millen, President; Dr. Q. A. Mulkey, Millen, Vice-President; Dr. C. Thompson, Millen, Secretary-Treasurer.

The Lowndes County Medical Society elected the following officers for the coming year: Dr. E. F. Thompson, Valdosta, President; Dr. L. R. Hutchinson, Adel, Vice-President; Dr. T. C. Williams, Valdosta, Secretary-Treasurer.

The Monroe County Medical Society elected the following officers for the coming year: Dr. W. J. Smith, Juliette, President; Dr. J. O. Elrod, Forsyth, Vice-President; Dr. G. H. Alexander, Forsyth, Secretary-Treasurer.

The Randolph County Medical Society elected the following officers for the coming year: Dr. F. S. Rogers, Coleman, President; Dr. Loren Gary, Jr., Shellman, Vice-President; Dr. W. G. Elliott, Cuthbert, Secretary-Treasurer.

The Sixth District Medical Society elected the following officers for the coming year: Dr. Harold C. Atkinson, Macon, President; Dr. William M. Cason, Sandersville, Vice-President; Dr. W. W. Chrisman, Macon, Secretary-Treasurer.

The Taliaferro County Medical Society elected the following officers for the coming year: Dr. John A. Rhodes, Crawfordville, President; Dr. T. C. Nash, Philomath, Secretary-Treasurer.

The Tattnall County Medical Society elected the following officers for the coming year: Dr. J. C. Collins, Collins, President; Dr. J. M. Hughes, Glennville, Secretary-Treasurer.

The Thomas County Medical Society elected the following officers for the coming year: Dr. E. F. Wahl, Thomasville, President; Dr. Harry Ainsworth, Thomasville, Vice-President; Dr. Rudolph Bell, Thomasville, Secretary-Treasurer.

The Tift County Medical Society elected the following officers for the coming year: Dr. Carlton A. Fleming, Tifton, President; Dr. J. D. Mangham, Tifton, Secretary-Treasurer.

The Toombs County Medical Society elected the following officers for the coming year: Dr. J. E. Mercer, Vidalia, President; Dr. W. W. Odom, Lyons, Secretary-Treasurer.

The Tri-Counties Medical Society elected the following officers for the coming year: Dr. Holt Darden, Blakely, President; Dr. W. O. Shepard, Bluffton, Vice-President; Dr. J. G. Standifer, Blakely, Secretary-Treasurer.

The Ware County Medical Society elected the following officers for the coming year: Dr. W. C. Hafford, Waycross, President; Dr. R. C. Walker, Waycross, Vice-President; Dr. K. McCullough, Waycross, Secretary-Treasurer.

The Whitfield County Medical Society elected the following officers for the coming year: Dr. E. O. Shellhorse, Dalton, President; Dr. D. L. Wood, Dalton, Vice-President; Dr. H. J. Ault, Dalton, Secretary-Treasurer.

The Tift County Medical Society was entertained at a turkey dinner recently by Dr. and Mrs. E. L. Evans, Tifton.

Continued on page 24

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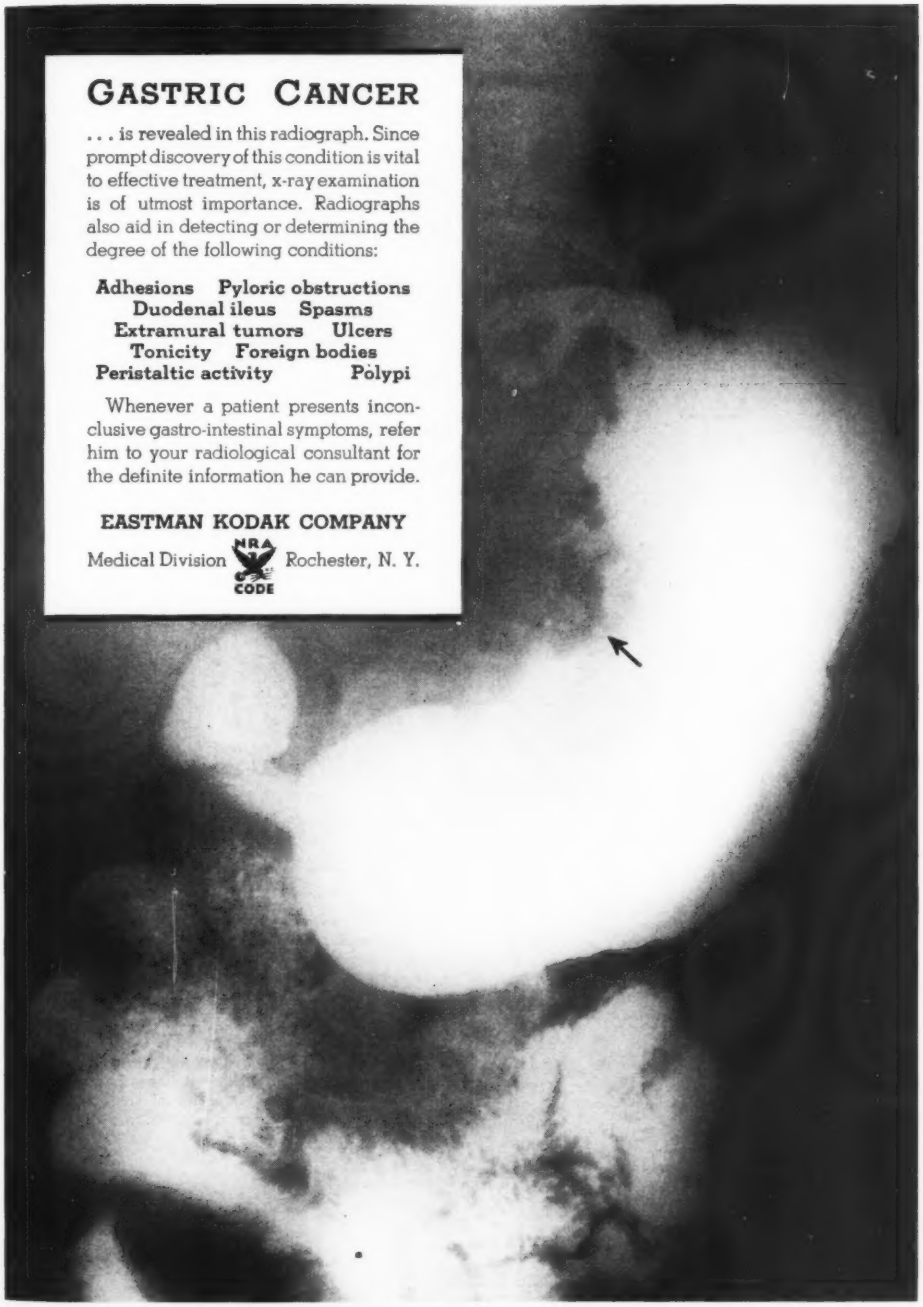
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Radiographs Provide Diagnostic Facts

Continued from page 22

The Ware County Medical Society was entertained recently at the Waycross Country Club by Dr. D. M. Bradley and Dr. W. F. Reavis.

The Berrien and Lowndes Counties Medical Societies were entertained recently at a turkey dinner by Dr. L. R. Hutchinson, Adel.

Dr. Hugh H. Barfield will be associated in practice with Dr. J. R. Barfield, Doctors Building, Atlanta.

Dr. Champ H. Holmes, Doctors Building, Atlanta, announces he will limit his practice to diseases of the chest.

Dr. John Heinze Venable and Miss Louise Felker Ware, both of Atlanta, were married December 18.

DEATHS

Dr. Edmund T. May, Warthen, aged 73, died December 13 of cerebral hemorrhage.

Dr. William A. Mathews, Hawkinsville, aged 72, died November 21 of heart disease.

Dr. Paul A. Woods, Atlanta, aged 52, died December 27 from burns received from the explosion of an oil stove in his office.

Dr. Lemuel Temple Waters, Savannah, aged 45, died November 14 of chronic myocarditis.

Dr. Alvin Barney Eberhart, McDonough, aged 44, died January 4.

KENTUCKY

The Campbell-Kenton Medical Society elected the following officers for the coming year: Dr. John Todd, Newport, President; Dr. H. C. White, Covington, Vice-President; Dr. C. A. Morris, Covington, Secretary; Dr. J. D. Northcutt, Covington, Treasurer.

The Perry County Medical Society elected the following officers for the coming year: Dr. B. M. Brown, Hazard, President; Dr. Guy Pinckley, Anco, Vice-President; Dr. R. L. Collins, Hazard, Secretary-Treasurer.

The Harrison County Medical Society elected the following officers for the coming year: Dr. H. Tod Smiser, Cynthiana, President; Dr. H. C. Blount, Cynthiana, Vice-President; Dr. W. B. Moore, Cynthiana, Secretary-Treasurer.

The Henderson County Medical Society elected the following officers for the coming year: Dr. W. V. Neel, Henderson, President; Dr. R. E. Smith, Henderson, Vice-President; Dr. W. L. O'Nan, Henderson, Secretary-Treasurer.

The Carlisle County Medical Society elected the following officers for the coming year: Dr. G. W. Payne, Bardwell, President; Dr. J. F. Harrell, Bardwell, Vice-President; Dr. J. F. Dunn, Arlington, Secretary-Treasurer.

The Taylor County Medical Society elected the following officers for the coming year: Dr. B. T. Black, Campbellsville, President; Dr. E. L. Gowdy, Campbellsville, Vice-President; Dr. W. B. Atkinson, Campbellsville, Secretary-Treasurer.

The Jefferson County Medical Society elected the following officers for the coming year: Dr. James H. Pritchett, Louisville, President; Dr. Clay L. Nichols, Louisville, First Vice-President; Dr. Margaret Hatfield, Louisville, Second Vice-President; Dr. Uly H. Smith, Louisville, Secretary-Treasurer.

Dr. Eric M. Matsner, New York, addressed the Jefferson County Medical Society recently.

Dr. Harvey J. Howard, St. Louis, addressed the Louisville Eye and Ear Society recently.

DEATHS

Dr. Milford Winslow Rozzell, Hopkinsville, aged 77, died December 10 of chronic interstitial nephritis.

Dr. Samuel William Weinberg, Louisville, aged 56, died November 21 of heart disease.

LOUISIANA

The Calcasieu Parish Medical Society elected the following

Continued on page 26

MAINTAIN MINERAL ALKALI BALANCE WITH KALAK

Hypertonic — Alkaline — Carbonated — Not Laxative

The years of experience with physicians who have used Kalak show that the use of a formula containing calcium, magnesium, sodium and potassium salts represents a correctly balanced solution. This is Kalak which, as such, aids in maintaining a balanced base reserve.

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Supplied in boxes of 51 tablets with removable label especially adapted to prescription purposes

IN THE mother during pregnancy and lactation, and in the child during the entire period of growth, the demand for calcium is greater than can be adequately supplied ordinarily by the daily diet.

Merely feeding some source of calcium may not suffice, for, even when the amount supplied in the diet is sufficient, utilization of calcium is ineffectual unless the factors controlling its absorption and retention are favorable.

Tablets Dicalcium Phosphate Compound with Viosterol Squibb supply calcium and phosphorus in optimum ratio together with Vitamin D, which aids absorption.

Each tablet contains 9 grains of Dicalcium Phosphate, 6 grains of Calcium Gluconate and 660 Vitamin D units, U.S.P. X (1934 Rev.). As a prophylactic against a negative calcium balance, 2 to 3 tablets daily, *between meals*. The tablets are wintergreen flavored and pleasant to chew.

Tablets Dicalcium Phosphate Compound *with* Viosterol Squibb

Continued from page 24

officers for the coming year: Dr. L. A. Hebert, Lake Charles, President; Dr. B. N. Sewell, Lake Charles, Vice-President; Dr. Eleanor Cook, Lake Charles, Secretary-Treasurer.

The Claiborne Parish Medical Society elected the following officers for the coming year: Dr. L. T. Waller, Haynesville, President; Dr. J. A. Wilkinson, Homer, Vice-President; Dr. H. R. Marlatt, Homer, Secretary-Treasurer.

The DeSoto Parish Medical Society elected the following officers for the coming year: Dr. H. P. Curtis, Mansfield, President; Dr. B. P. Smith, Jr., Keatchie, Vice-President; Dr. W. G. Jones, Mansfield, Secretary-Treasurer.

The Fifth District Medical Society elected the following officers for the coming year: Dr. John G. Snellings, Monroe, President; Dr. H. C. Chambers, Rayville, Vice-President; Dr. C. Prentice Gray, Jr., Monroe, Secretary-Treasurer.

The Jackson-Lincoln Bi-Parish Medical Society elected the following officers for the coming year: Dr. William M. McBride, Hodge, President; Dr. Thomas A. Dekle, Jonesboro, Vice-President; Dr. W. S. Rutledge, Ruston, Secretary-Treasurer.

The Ouachita Parish Medical Society elected the following officers for the coming year: Dr. I. J. Wolff, Monroe, President; Dr. H. E. Guerriero, Monroe, Vice-President; Dr. H. S. Coon, Monroe, Secretary-Treasurer.

The Pointe Coupee Parish Medical Society elected the following officers for the coming year: Dr. M. O. Becnel, New Roads, President; Dr. J. S. Branch, Lettsworth, Vice-President; Dr. F. F. Rougon, New Roads, Secretary-Treasurer.

The Rapides Parish Medical Society elected the following officers for the coming year: Dr. D. B. Barber, Alexandria, President; Dr. M. B. Pearce, Alexandria, First Vice-President; Dr. D. V. Donaldson, Dry Prong, Second Vice-President; Dr. N. T. Simmonds, Alexandria, Secretary-Treasurer.

The Vernon Parish Medical Society elected the following officers for the coming year: Dr. J. F. Smith, Leesville, President; Dr. W. T. Franklin, Anacoco, Vice-President; Dr. D. O. Willis, Leesville, Secretary-Treasurer.

The Tri-Parish Medical Society elected the following officers for the coming year: Dr. B. L. Bailey, Epps, President; Dr. J. P. Davis, Lake Providence, Dr. D. W. Kelly, Oak Grove, and Dr. E. O. Edgerton, Tallulah, Vice-Presidents; Dr. G. S. Hopkins, Lake Providence, Secretary-Treasurer.

In Cardiac Disease

Most clinicians have recognized the value of certain sugars in the treatment of cases of cardiac disease.

A large part of the soluble carbohydrates contained in **Horlick's, the Original Malted Milk,** is malt-sugar, and recent research proves that malt-sugar gives a greater energy return than other sugars. But Horlick's also has great advantages—it contains no starch, is easily digested, does not cause flatulence, corrects constipation, and acts as a mild stimulant.

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RACINE, WIS.

Dr. John T. Crebbin, Shreveport, has opened offices at 413-14 Medical Arts Building.

Dr. Jules Myron Davidson, New Orleans, has opened offices in the Canal Bank Building.

DEATHS

Dr. J. Louis C. Perriliat, New Orleans, aged 59, died in December of bronchopneumonia and septicemia.

Dr. Allyn Bernard Moise, Shreveport, aged 57, died December 23 of pneumonia.

Dr. J. C. Derbofen, New Orleans, aged 63, died January 11.

MARYLAND

Dr. John Charles Grant Ledingham, Director, Lister Institute, London, England, lectured at Johns Hopkins University School of Medicine recently, delivering the twenty-second course of lectures under the Herter Foundation.

Dr. Walter L. Winkenwerder and Miss Eleanor Zouck, both of Baltimore, were married December 1.

DEATHS

Dr. Albert Lafayette Levy, Baltimore, aged 52, died December 29 of coronary thrombosis.

Dr. Joseph Roach, Baltimore, died October 27.

Dr. William Alfred Strauss, Baltimore, aged 38, died November 22 of lobar pneumonia.

MISSISSIPPI

The Newton County Medical Society elected the following officers for the coming year: Dr. W. E. Box, Newton, President; Dr. H. B. Gilmer, Hickory, Vice-President; Dr. Dudley Stennis, Newton, Secretary.

The East Mississippi Medical Society elected the following officers for the coming year: Dr. H. L. Arnold, Meridian, President; Dr. T. L. Bennett, Meridian, Secretary; Dr. A. C. Bryan, Meridian, Treasurer.

The Lauderdale County Medical Society elected the following officers for the coming year: Dr. H. S. Gully, Meridian, President; Dr. E. B. Key, Meridian, Vice-President; Dr. R. L. Donald, Meridian, Secretary.

The Jackson County Medical Society elected the following officers for the coming year: Dr. J. N. Lockard, Pascagoula, President; Dr. A. P. McArthur, Moss Point, Vice-President; Dr. J. N. Rape, Moss Point, Secretary.

The Winona District Medical Society elected the following officers for the coming year: Dr. W. O. Mabry, Goodman, President-Elect; Dr. S. L. Bailey, Kosciusko, Dr. W. H. Curry, Eupora, Dr. D. H. Thomas, French Camp, Dr. J. K. Avent, Grenada, Dr. G. S. Redditt, McCarley, Dr. R. C. Elmore, Durant, and Dr. E. W. Holmes, Winona, Vice-Presidents; Dr. P. B. Brumby, Lexington, Secretary.

The DeSoto County Medical Society elected the following officers for the coming year: Dr. A. J. Weissinger, Hernando, President; Dr. J. M. Wright, Hernando, Vice-President; Dr. L. L. Minor, Secretary-Treasurer.

Dr. P. B. Brumby, Lexington, recently spent some time in New York City doing postgraduate work.

Dr. F. E. Rehfeldt, Jackson, recently spent some time in Chicago doing postgraduate work.

Dr. S. M. Shankle, Hollandale, has been reelected Mayor of Hollandale.

Dr. A. M. McCune has located in Decatur for the practice of medicine.

DEATHS

Dr. Joseph Price Watson, Hazlehurst, aged 54, died December 29 of heart disease.

Dr. Joseph Marvin Ware, Jackson, aged 55, died December 10 of cerebral hemorrhage.

Dr. Mosley Stuart Chandler, Columbus, aged 67, died December 5 of amebic dysentery.

Dr. W. O. Babry, Goodman, aged 61, died December 27.

MISSOURI

Dr. Quitman U. Newell has been appointed General Chairman for the St. Louis meeting of the Southern Medical Association in November, Dr. John R. Caulk and Dr. John C. Morfit, Vice-General Chairmen, and Dr. G. V. Stryker, Secretary, all of St. Louis, the appointments having been announced recently by Dr. Neil S. Moore, President of the host society, the St. Louis Medical Society. Chairmen of the various sub-committees will be announced later.

Continued on page 28

MILK INGESTION IS EASY THIS WAY

When children refuse to drink milk, why not give it to them in a form they **will** take—a concentrated, tasty form?

KLIM, the powdered whole milk, contains the full food value of milk . . . all the proteins, minerals, butterfats and vitamins . . . **in one-eighth the volume of the liquid.** Isn't it so much easier for the child to ingest this comparatively small quantity? Especially when it reinforces a delicious cereal, beverage or cake?

KLIM cookbook (Reinforced Diet Recipes) offers a great variety of KLIM augmented recipes. It affords a logical, easy method of concentrated feeding. Ideal for fussy convalescents, too. As many of these booklets for patient distribution as you desire, are yours for the asking; also KLIM samples. Just mail the coupon.

One of the Fine Recipes from "Reinforced Diet Recipes":

PEANUT BUTTER SANDWICH FILLING

1 tablespoon peanut butter
1 tablespoon water
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Blend peanut butter and water to a smooth paste. Add KLIM slowly, stiring to prevent lumps. Spread on bread. Volume: Filling for 1 sandwich. This recipe furnishes ½ cup of milk (84 calories) over normal recipes.

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Please send me a free supply of "Reinforced Diet Recipes."

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Continued from page 26

A dinner honoring Dr. John C. Morfit, retiring President of the St. Louis Medical Society, was held at the Missouri Athletic Association on January 24, at which time Dr. and Mrs. Morfit were presented with a silver service.

The Kansas City Pathological Society elected Dr. William K. Trimble, President, and Dr. Arthur H. Wells, Secretary, at its organization meeting recently.

The Jackson County Medical Society, meeting conjointly with the Wyandotte County Medical Society and the Kansas City Southwest Clinical Society, had as guest speaker Dr. Owen H. Wangensteen, Minneapolis.

DEATHS

Dr. Edward Richter, St. Louis, aged 66, died recently of cerebral hemorrhage.

Dr. Orson Rueze Crooks, Kansas City, aged 64, died December 13 of coronary thrombosis and arteriosclerosis.

Dr. Elisha Whitten Tinsley, Montgomery City, aged 68, died November 28 of carcinoma of the pancreas.

Dr. Owen Alonzo Smith, Farmington, aged 66, died December 2 of carcinoma of the stomach.

Dr. Thornton Easley Moore, Trenton, aged 56, died recently of angina pectoris.

Dr. Walter C. Hamilton, Kearney, aged 80, died December 25 of pneumonia.

Dr. William Henry Heidorn, Bridgeton, aged 74, died December 26 of pneumona.

Dr. Henry Francis Strub, St. Louis, aged 33, died December 10 of heart disease.

Dr. Eugene Leo Broeker, St. Louis, aged 53, died suddenly December 24 of heart disease.

NORTH CAROLINA

The New Hanover County Medical Society elected the following officers for the coming year: Dr. A. H. Elliot, Wilmington, President; Dr. T. P. Powers, Vice-President; Dr. Graham Barefoot, Wilmington, Secretary-Treasurer.

The Robeson County Medical Society elected the following officers for the coming year: Dr. J. N. Britt, Lumberton, President; Dr. C. T. Johnson, Red Springs, President-Elect; Dr. D. H. Reed, Maxton, Vice-President; Dr. N. O. Benson, Lumberton, Secretary-Treasurer.

The Wilson County Medical Society elected the following officers for the coming year: Dr. C. S. Eagles, Saratoga, President; Dr. Ralph L. Fike, Wilson, Vice-President; Dr. C. E. Simons, Wilson, Secretary-Treasurer.

The McDowell County Medical Society elected the following officers for the coming year: Dr. J. F. Jonas, Marion, President; Dr. L. L. Williams, Fayetteville, Secretary.

The Iredell-Alexander Medical Society elected the following officers for the coming year: Dr. L. R. Shaw, Statesville, President; Dr. W. D. McLelland, Mooresville, First Vice-President; Dr. H. L. Price, Taylorsville, Second Vice-President; Dr. W. A. Trivette, Houstonville, Third Vice-President; Dr. W. M. Long, Mocksville, Fourth Vice-President; Dr. C. B. Herman, Statesville, Secretary-Treasurer.

The Halifax County Medical Society elected the following officers for the coming year: Dr. W. G. Suiter, Weldon, President; Dr. B. M. Nicholson, Enfield, Vice-President; Dr. R. S. McGeachy, Weldon, Secretary-Treasurer.

The Third District Medical Society elected the following officers for the coming year: Dr. W. S. Dosher, Southport, President; Dr. W. C. Mebane, Jr., Wilmington, Vice-President; Dr. Donald B. Koonce, Wilmington, Secretary-Treasurer.

The Guilford County Medical Society had as guest speaker at the January meeting Dr. Hubert Royster, Raleigh.

The Wayne County Medical Society on January 18 held their annual Ladies' night dinner.

The Duke University School of Medicine and the School of Nursing began their winter quarters on January 3.

Dr. Glenn Wilson tendered his resignation as Health Officer of Sampson County and is going into private practice in Angier.

Dr. B. B. Dalton, Rockingham, was recently elected Director of the County Health Department of Richmond County.

DEATHS

Dr. Daniel Edward Sevier, Asheville, aged 66, died December 4 of coronary occlusion.

Dr. Paul Peyton Lane, Wilson, aged 47, died suddenly December 20 of heart disease.

Dr. Daniel Calvin Corriher, Landis, aged 33, died December 13 of pneumonia.

Dr. B. F. McMillan, Red Springs, aged 82, died January 14 of arteriosclerosis.

Dr. Frank E. Deeds, Winston Salem, aged 44, died recently.

Dr. Harold J. Weaver, Brook's Cross Road, aged 37, died January 14 of pneumonia.

Dr. T. M. Misenheimer, Concord, aged 37, died January 4.

Dr. W. F. Carter, Crozet, aged 86, died Janary 1 after a brief illness.

OKLAHOMA

The Leflore County Medical Society elected the following officers for the coming year: Dr. W. M. Duff, Braden, President; Dr. R. L. Wright, Poteau, Vice-President; Dr. Harrell Hardy, Poteau, Secretary.

The Woodward County Medical Society elected the following officers for the coming year: Dr. D. W. Darwin, Woodward, President; Dr. J. P. Davis, Shattuck, Vice-President; Dr. C. W. Tedrowe, Woodward, Secretary-Treasurer.

The Jefferson County Medical Society elected the following officers for the coming year: Dr. C. M. Maupin, Waurika, President; Dr. L. L. Wade, Ryan, Vice-President; Dr. D. B. Collins, Waurika, Secretary.

The Alfalfa County Medical Society elected the following officers for the coming year: Dr. J. P. Bishop, Alin, President; Dr. Z. J. Clark, Cherokee, Vice-President; Dr. L. T. Lancaster, Cherokee, Secretary.

The Woods County Medical Society elected the following officers for the coming year: Dr. I. F. Stephenson, Alva, President; Dr. C. A. Tracerse, Alva, Vice-President; Dr. O. E. Templin, Alva, Secretary.

The Caddo County Medical Society elected the following officers for the coming year: Dr. Otis A. Cook, Apache, President; Dr. Fred Dinkler, Fort Cobb, Vice-President; Dr. P. H. Anderson, Anadarko, Secretary.

The Tulsa County Medical Society elected the following officers for the coming year: Dr. Walter S. Larrabee, Tulsa, President; Dr. James Stevenson, Tulsa, Vice-President; Dr. David V. Hudson, Tulsa, Secretary-Treasurer.

The Garvin County Medical Society elected the following officers for the coming year: Dr. E. F. Taylor, Maysville, President; Dr. R. M. Alexander, Paoli, Vice-President; Dr. John R. Callaway, Paul's Valley, Secretary.

Continued on page 30

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Continued from page 28

The Washington County Medical Society elected the following officers for the coming year: Dr. J. G. Smith, Bartlesville, President; Dr. J. E. Crawford, Bartlesville, Vice-President; Dr. J. V. Athey, Bartlesville, Secretary; Dr. O. I. Green, Bartlesville, Treasurer.

The Pittsburg County Medical Society elected the following officers for the coming year: Dr. Floyd T. Bartheld, McAlester, President; Dr. B. B. Kies, McAlester, Vice-President; Dr. L. C. Kuyrkendall, McAlester, Secretary.

Dr. E. Rankin Denny, Tulsa, recently spent two weeks in Cincinnati taking a special course at the University Medical School.

Dr. Esther Margaret Kirk and Mr. Roy A. Foster, both of Oklahoma City, were married January 7.

DEATHS

Dr. Frank Harrison McGregor, Mangum, aged 47, died January 5 from injuries received when he was struck by a truck.

Dr. Thomas E. Brents, Ada, aged 88, died December 29 of bronchopneumonia.

Dr. John Ellis Standifer, Elk City, aged 68, died December 23.

Dr. I. S. Freeman, Weatherford, aged 49, died December 27 after a short illness.

SOUTH CAROLINA

The Columbia Medical Society elected the following officers for the coming year: Dr. O. B. Mayer, Columbia, President; Dr. Ben Rubinowitz, Columbia, Secretary; Dr. Tom Dotterer, Columbia, Treasurer.

The Greenville County Medical Society elected the following officers for the coming year: Dr. B. C. Bishop, Greenville, President; Dr. William McNeil Carpenter, Greenville, Secretary; Dr. J. W. Jervey, Jr., Greenville, Treasurer.

Dr. Eddie Houston Thomason, Olanta, and Miss Kate Goodwin Odiorne were married December 20.

DEATHS

Dr. William Montgomery Burnett, Greenville, aged 58, died January 7 of heart disease.

Dr. Thomas Hugh Tuten, Almeda, aged 59, died November 21 of cirrhosis of the liver.

TENNESSEE

The Anderson County Medical Society elected the following officers for the coming year: Dr. Thomas Jennings, Clinton, President; Dr. Edward Dickson, Coal Creek, Vice-President; Dr. J. S. Hall, Clinton, Secretary-Treasurer.

The Bradley County Medical Society elected the following officers for the coming year: Dr. Vance H. Bell, Cleveland, President; Dr. D. N. Arnold, Cleveland, Vice-President; Dr. William A. Garrott, Cleveland, Secretary-Treasurer.

The Carter County Medical Society elected the following officers for the coming year: Dr. E. T. Pearson, Elizabethton, President; Dr. J. B. Shoun, Elizabethton, Vice-President; Dr. E. L. Caudell, Elizabethton, Secretary-Treasurer.

The Davidson County Medical Society elected the following officers for the coming year: Dr. W. G. Kennon, Nashville, President; Dr. H. S. Shoulders, Nashville, Vice-President; Dr. J. P. Gilbert, Nashville, Secretary-Treasurer.

The Dyer, Lake and Crockett Counties Medical Society elected the following officers for the coming year: Dr. E. H. Baird, Dyersburg, President; Dr. P. E. Miller, Tigrett, Dr. R. C. Newkirk, Tiptonville, Dr. J. O. McKinney, Friendship, Vice-Presidents; Dr. C. L. Denton, Dyersburg, Secretary-Treasurer.

The Franklin County Medical Society elected the following officers for the coming year: Dr. W. F. Smith, Decherd, President; Dr. A. P. Smith, Winchester, Vice-President; Dr. John P. Grisard, Winchester, Secretary-Treasurer.

The Giles County Medical Society elected the following officers for the coming year: Dr. Joe B. Wright, Lynnville, President; Dr. R. E. Warren, Pulaski, Vice-President; Dr. T. F. Booth, Pulaski, Secretary-Treasurer.

The Greene County Medical Society elected the following officers for the coming year: Dr. L. E. Dyer, Greeneville, President; Dr. M. A. Blanton, Mosheim, Vice-President; Dr. C. P. Lox, Jr., Greeneville, Secretary-Treasurer.

The Haywood County Medical Society elected the following officers for the coming year: Dr. W. D. Poston, Brownsville, President; Dr. A. H. Sorrelle, Brownsville, Vice-President; Dr. Roy M. Lanier, Brownsville, Secretary-Treasurer.

The Jackson County Medical Society elected the following officers for the coming year: Dr. J. D. Quarles, Whitleyville,

Continued on page 32

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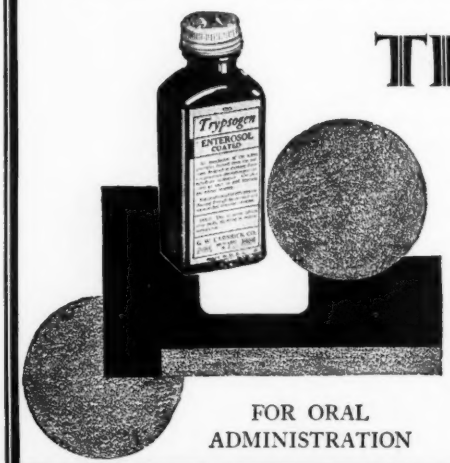

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"The Milk Question"

by M. J. ROSENAU, Professor of Preventive Medicine and Hygiene, Harvard Medical School.

"Man has but a single stomach and this forms about twenty per cent of the digestive tract. The cow has four stomachs which form about seventy percent of the digestive tract. The calf's stomach is well fitted to handle and digest the tough, lumpy curds which form from cow's milk. Woman's milk curdles into a soft mass which is broken into numberless small particles. Evidently the stomach of the infant fed with cow's milk is over-taxed trying to break the tough curds into particles small enough for complete digestion. It is therefore evident that even if we could secure cow's milk, the chemical composition of which was exactly the same as that of human milk, it would still be far from a perfect substitute unless it behaved similarly in the digestive tract."

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Continued from page 30

President; Dr. R. C. Gaw, Gainesboro, Vice-President; Dr. F. B. Clark, Gainesboro, Secretary-Treasurer.

The Knox County Medical Society elected the following officers for the coming year: Dr. Eugene Abercrombie, Knoxville, President; Dr. W. F. Christenberry, Knoxville, Vice-President; Dr. Jesse C. Hill, Knoxville, Secretary-Treasurer.

The McMinn County Medical Society elected the following officers for the coming year: Dr. R. W. Epperson, Athens, President; Dr. S. B. McClary, Sr., Etowah, Vice-President; Dr. L. A. Brendle, Englewood, Secretary-Treasurer.

The Monroe County Medical Society elected the following officers for the coming year: Dr. T. M. Roberts, Sweetwater, President; Dr. W. J. Cameron, Sweetwater, Secretary-Treasurer.

The Polk County Medical Society elected the following officers for the coming year: Dr. H. P. Hyde, Copperhill, President; Dr. W. Y. Gilliam, Copperhill, Vice-President; Dr. F. O. Geisler, Isabella, Secretary-Treasurer.

The Putnam County Medical Society elected the following officers for the coming year: Dr. Z. L. Shipley, Cookeville, President; Dr. J. Fred Terry, Cookeville, Vice-President; Dr. Thurman Shipley, Cookeville, Secretary-Treasurer.

The Roane County Medical Society elected the following officers for the coming year: Dr. L. A. Killefer, Harriman, President; Dr. R. F. Register, Rockwood, Vice-President; Dr. W. W. Hill, Harriman, Secretary-Treasurer.

The Rutherford County Medical Society elected the following officers for the coming year: Dr. J. D. Hall, Readyville, President; Dr. J. A. Scott, Murfreesboro, Secretary-Treasurer.

The Sevier County Medical Society elected the following officers for the coming year: Dr. O. H. Yarberry, Sevierville, President; Dr. C. P. Wilson, Sevierville, Secretary-Treasurer.

The Smith County Medical Society elected the following officers for the coming year: Dr. R. E. Key, Monoville, President; Dr. Rhea E. Garrett, Dixon Springs, Vice-President; Dr. Thayer S. Wilson, Sevierville, Secretary-Treasurer.

The Sullivan and Johnson Counties Medical Society elected the following officers for the coming year: Dr. W. R. Rogers, Bristol, Virginia, President; Dr. L. C. Cox, Kingsport, Dr. J. C. Hutchenson, Crandull, Vice-Presidents; Dr. Arthur Hooks, Bristol, Secretary-Treasurer.

The Weakley County Medical Society elected the following officers for the coming year: Dr. R. W. Brandon, Martin, President; Dr. H. G. Edmonson, Martin, Vice-President; Dr. P. W. Wilson, Dresden, Secretary-Treasurer.

The White County Medical Society elected the following officers for the coming year: Dr. S. E. Gaines, Sparta, President; Dr. Vernon Hutton, Ravenscroft, Vice-President; Dr. A. F. Richards, Sparta, Secretary-Treasurer.

The Williamson County Medical Society elected the following officers for the coming year: Dr. T. C. Rice, Franklin, President; Dr. R. H. Hutchison, Franklin, Vice-President; Dr. K. S. Howlett, Sr., Franklin, Secretary-Treasurer.

The Wilson County Medical Society elected the following officers for the coming year: Dr. J. L. Ames, Lebanon, President; Dr. C. C. Young, Alexandria, Vice-President; Dr. J. R. Bone, Lebanon, Secretary-Treasurer.

The Memphis and Shelby Counties Medical Society elected the following officers for the coming year: Dr. R. F. Mason, Memphis, President-Elect; Dr. R. G. Henderson, Memphis, Vice-President; Dr. J. J. Hobson, Memphis, Secretary; Dr. A. F. Cooper, Memphis, Treasurer.

The Memphis Pediatric Society elected the following officers for the coming year: Dr. W. D. Mims, President; Dr. C. V. Croswell, Vice-President; Dr. W. R. Graves, Secretary-Treasurer.

The Mid-South Postgraduate Medical Assembly was held at the Hotel Peabody, Memphis, February 12-15.

Dr. W. T. Black, Memphis, has been elected Vice-President of the Southern Surgical Association.

Dr. E. G. Kelly, Memphis, and Miss Miriam Herstein were married recently.

Dr. Hugh Victor DuBois and Mrs. F. M. Latham, both of Athens, were married December 4.

Dr. Webb Key, Memphis, and Miss Mary Elizabeth Fry were married recently.

Dr. C. D. Blassingame, Memphis, and Miss Glen Johnston were married recently.

Deaths

Dr. John Charles Whitacre, Memphis, aged 64, died November 15 of malignant tumor of the gastro-intestinal tract.

Dr. William Fletcher Smith, Memphis, aged 69, died November 20 of heart disease.

Dr. George S. Hays, Greeneville, aged 72, died December 25 of cerebral hemorrhage.

Contiued on page 34

BREAST MILK *from the Normal Mother*
is the
IDEAL FOOD
for the
HUMAN INFANT

That is Why

S. M. A. is Made to Resemble BREAST MILK

in percentages of carbohydrate, protein, fat and total salts (ash) content, and why even the chemical and physical constants of the fat in S.M.A. are like those of breast milk fat.

When breast milk is not available, some modification of cows' milk is the usual choice. If breast milk is ideal, a cows' milk modification should be as close as possible to human breast milk.

We think S.M.A. is an excellent choice for infants deprived of breast milk because of its significant resemblances to breast milk. Even the fat of S.M.A. has the same character numbers and answers the same tests in the same way as does the fat of breast milk. Adaptation of the fats is practically impossible to achieve outside of a laboratory.

S. M. A. was developed at the Babies and Childrens Hospital of Cleveland. It has been ethically offered from the very beginning. Physicians who prescribe it tell us that it produces excellent nutritional results more simply and more quickly.

S.M.A. is a food for infants—derived from tuberculin tested cows' milk, the fat of which is replaced by animal and vegetable fats including biologically tested cod liver oil; with the addition of milk sugar, potassium chloride and salts; altogether forming an antirachitic food. When diluted according to directions, it is *essentially similar to human milk* in percentages of protein, fat, carbohydrates and ash, in chemical constants of the fat and in physical properties. © 1935, S.M.A. Corporation, Cleveland, Ohio

Continued from page 32

Dr. Thomas Clarke Graves, Memphis, aged 64, died December 24 of carcinoma of the prostate.

Dr. George W. Webb, Redboiling Spring, aged 86, died November 2 of carcinoma of the spleen.

Dr. Nathaniel Rives Newman, Covington, aged 59, died November 30 of hypertensive heart disease.

TEXAS

The Medina, Uvalde, Maverick, Val Verde, Terrell, Edwards, Real, Kinney and Zavala Counties Medical Society elected the following officers for the coming year: Dr. Lucian M. Warner, Eagle Pass, President; Dr. W. A. Latimer, Uvalde, Vice-President; Dr. Alfonso Riddle, Eagle Pass, Secretary-Treasurer.

The Beaumont Academy of Medicine elected the following officers for the coming year: Dr. C. M. White, President; Dr. W. A. Smith and Dr. William G. Wallace, Vice-Presidents; Dr. G. H. Bevil, Secretary.

Dr. J. M. Meynier has located in the Medical Arts Building, Houston, after finishing his internship in a New York hospital.

Dr. H. Seward Wills, formerly of New Orleans, has located in the Medical Arts Building, Houston, for the practice of obstetrics.

Dr. Herbert F. Poyner, Houston, has opened offices in the Medical Arts Building.

Dr. J. Manning Venable, San Antonio, has moved to the Nix Professional Building.

Dr. Merton M. Minter, San Antonio, has moved to the Nix Professional Building.

Dr. David R. Sacks, San Antonio, has moved to the Alamo National Building.

DEATHS

Dr. Eugene Moore Fowler, Dallas, aged 70, died December 27 of coronary occlusion.

Dr. John W. Merritt, Center Point, aged 75, died December 21 of arteriosclerosis.

Dr. John H. Wylie, Winnsboro, aged 64, died November 24 of bronchopneumonia.

Dr. John William Jeffries, Mission, aged 73, died December 12.

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VIRGINIA

The Patrick Henry Medical Society elected the following officers for the coming year: Dr. F. B. Teague, Martinsville, President; Dr. B. A. Hopkins, Stuart, Vice-President; Dr. C. R. Titus, Bassett, Secretary.

The Northampton County Medical Society elected the following officers for the coming year: Dr. J. R. Hamilton, Nassawadox, President; Dr. J. M. Lynch, Cape Charles, Vice-President; Dr. W. Carey Henderson, Nassawadox, Secretary-Treasurer.

The James City-New Kent Medical Society elected the following officers for the coming year: Dr. B. I. Bell, Williamsburg, President; Dr. E. B. Kilby, Tono, Vice-President; Dr. L. V. Henderson, Williamsburg, Secretary-Treasurer.

The Gill Memorial Eye, Ear and Throat Hospital, Roanoke, will hold its ninth annual spring course in ophthalmology, otology, rhinology, laryngology, facio-maxillary surgery, bronchoscopy and esophagoscopy April 15-20.

Dr. Letcher E. Trent has been appointed Chief Medical Officer of the new Veterans' Administration Facility at Roanoke.

Dr. Charles Howe Eller has been appointed Health Officer for Albemarle County and the City of Charlottesville.

Dr. V. W. Quillen, Nickelsville, is spending some time in New Orleans at Tulane University for postgraduate review courses.

Dr. J. G. Bentley, formerly of Blackwood, is now located at Pardee.

Dr. Henry L. Bastien, formerly of Williamsport, Pennsylvania, has located at Clarendon for the practice of medicine.

Dr. Paul S. Hill has opened offices in the Professional Building, Harrisonburg, for the practice of general surgery.

Dr. Charles W. Scott, formerly of Hampton, is now located at Newport News.

Dr. Paul Q. Daniel, Deltaville, and Miss Salome Virginia Butler were married November 1.

Dr. J. E. Haynesworth, Buckingham, and Miss Paula Irving were married January 19.

Dr. Arthur Clayton Sinton, Jr., and Mrs. Virginia Chesterman Wickham, both of Richmond, were married January 15.

DEATHS

Dr. William Tilden Smith, Norfolk, aged 56, died December 28.

Dr. Charles Dudley Underhill, Middlebrook, aged 68, died January 10.

WEST VIRGINIA

The Hancock County Medical Society elected the following officers for the coming year: Dr. C. A. Shafer, Chester, President; Dr. J. A. Fisher, New Cumberland, First Vice-President; Dr. Sam Berardelli, Weirton, Second Vice-President; Dr. L. A. Whitaker, Weirton, Secretary-Treasurer.

The Wyoming County Medical Society elected the following officers for the coming year: Dr. J. O. Bailiff, Mullens, President; Dr. F. H. Penn, Covel, Vice-President; Dr. Ward Wylie, Mullens, Secretary-Treasurer.

The Tyler-Wetzel County Medical Society elected the following officers for the coming year: Dr. A. L. Coffield, New Martinsville, President; Dr. J. O. Theiss, New Martinsville, Vice-President; Dr. T. B. Gordon, Pine Grove, Secretary-Treasurer.

The Logan County Medical Society elected the following officers for the coming year: Dr. Harold Van Hoose, Whitmans, President; Dr. V. A. Deason, Logan, Vice-President; Dr. E. H. Starcher, Omar, Secretary-Treasurer.

The Harrison County Medical Society elected the following officers for the coming year: Dr. H. H. Haynes, Clarksburg, President; Dr. R. B. Linger, Clarksburg, Vice-President; Dr. Creed C. Greer, Clarksburg, Secretary; Dr. James T. Brennan, Clarksburg, Treasurer.

The Kanawha County Medical Society elected the following officers for the coming year: Dr. O. H. Bobbitt, Charleston, President; Dr. J. U. Rohr, Charleston, Vice-President; Dr. P. A. Tuckwiller, Charleston, Secretary-Treasurer.

The Marion County Medical Society elected the following officers for the coming year: Dr. G. H. Traugh, Fairmont, President; Dr. C. J. Carter, Fairmont, Vice-President; Dr. A. H. Stevens, Fairmont, Secretary; Dr. C. W. Waddell, Fairmont, Treasurer.

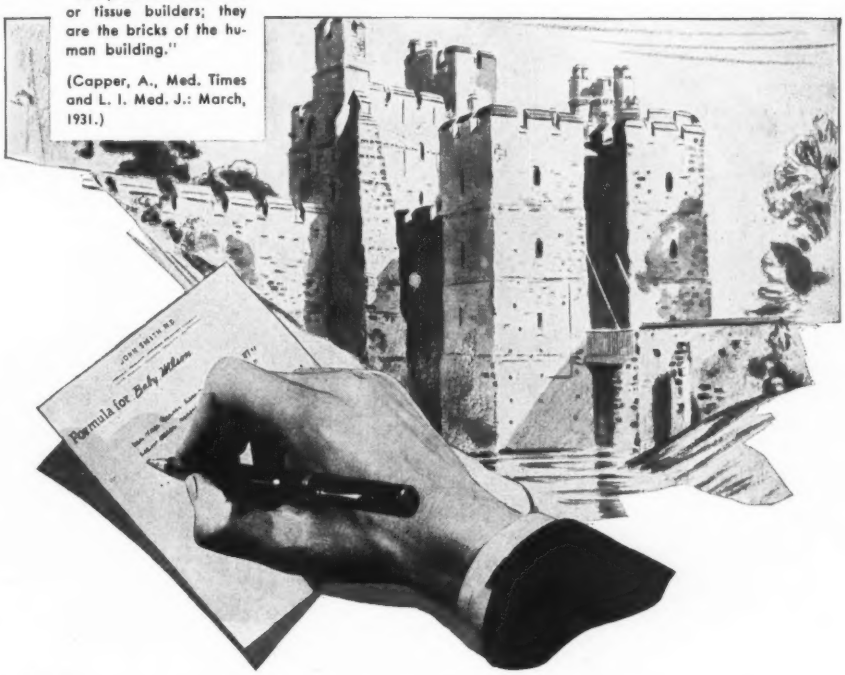
The McDowell County Medical Society elected the following officers for the coming year: Dr. C. R. Hughes, Kimball, President; Dr. E. E. Vermillion, Welch, Vice-President; Dr. R. H. Edward, Welch, Secretary; Dr. F. E. LaPrade, Welch, Treasurer.

DEATHS

Dr. Z. T. Kalbaugh, Piedmont, aged 65, died January 11 following a paralytic stroke.

Dr. John B. Walkinshaw, Wellsburg, aged 74, died November 14 of chronic myocarditis.

Dr. Robert U. Drinkard, Wheeling, aged 55, died January 3 of myocarditis.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(Capper, A., Med. Times and L. I. Med. J.: March, 1931.)
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*Nicholson, P., J. Med. Soc. N. J.: March, 1931

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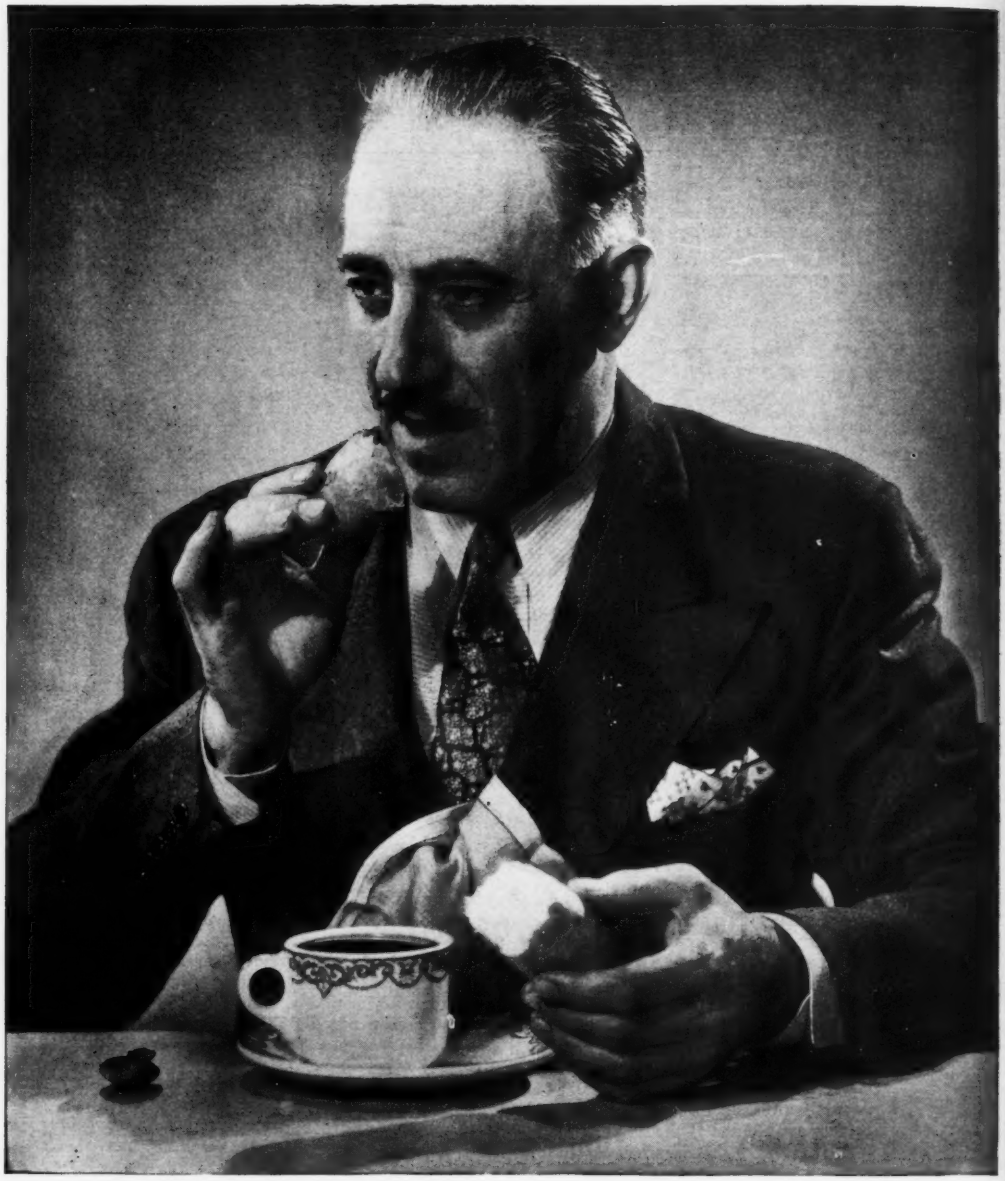

The "Continental" Breakfast

is not suitable for a growing child

In far too many homes, a breakfast of a roll and a cup of coffee is the fare for children as well as adults. Woefully deficient in vitamins and minerals, such a meal furnishes little more than a small amount of calories. A dish of Pablum and milk, however, is just as easily prepared as a "continental breakfast," but furnishes a variety of minerals (calcium, phosphorus, iron, and copper) and vitamins (A, B, G, and E) not found so abundantly in any other cereal or breadstuff.

The addition of a glass of orange juice and one Mead's Capsule of Viosterol in Halibut Liver Oil can easily build up this simple breakfast into a nourishing meal for the children of the family as well as the adult members. It is within the physician's province to inquire into and advise upon such matters, especially since Mead Products are never advertised to the public. *Servamus Fidem*, "We Are Keeping the Faith."

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Weight of Clinical Proof Favors Dextri-Maltose

Continued down from 1911

1923

"Carbohydrates were added gradually. Dextri-maltose is apparently the best of the sugars."—*A. Brown and G. Boyd: Acute intestinal intoxication in infants, Canad. Med. A. J. 13:800-803, Nov. 1923.*

1923

"With the protein milk feeding in a couple of days the stools become putty like and constipated. When this occurs we can gradually add dextri-maltose to the diet, finally working the baby back to a milk diet."—*F. B. Morgan: Underfeeding and fat indigestion in infants, Iowa Homeopathic J. 18:75-87, Aug. 1923.*

1924

". . . the ferment maltase which converts maltose into a monosaccharide evidently occurs in other parts of the body as well as the intestines because when it is injected subcutaneously it can not be recovered in the urine. This partly accounted for the fact that the power of assimilation of the body for maltose is twice that of the other two, as Czerny and Keller found. For this reason the possibility of over stepping the infant's tolerance for sugar is fifty per cent less when this sugar is used. In being more rapidly inverted and absorbed it is less liable to cause fermentation. Clinically these observations have been borne out and the consensus of opinion favors maltose as the sugar of choice. Czerny, Keller, Finkelstein, Langstein, and Meyer used it in a preparation consisting of about equal parts of dextrin and maltose with some sodium chloride."—*Artificial feeding of infants, International Med. Digest, 5:661-667, July 1924.*

1924

"In a communication published in 1918, the author reported striking results in eleven out of twelve cases. The initial mixture in most instances consisted of 270 c.c. skimmed milk, 360 c.c. water, 60 g. farina and 30 g. dextri-maltose boiled an hour or longer in a double boiler until sufficiently thick to adhere to an inverted spoon. . . . In 1921 his series of cases so treated had reached twenty-eight, with a mortality of 3.5 per cent."—*L. W. Sauer: Hypertrophic pyloric stenosis, Arch. Pediat. 41:145-170, March 1924.*

1924

In dyspepsia, "The carbohydrate must not be allowed to exceed 3 per cent. Dextri-maltose is the most suitable sugar."

In the treatment of decomposition (atrophy, malnutrition, marasmus), ". . . when there has been obvious improvement, dextri-maltose is gradually increased from 3 to 5 per cent."—*B. Myers: The nutritional disturbances of infancy, Brit. M. J. 1:1079-1083, June 21, 1924.*

1924

In acute dyspepsia, "Some carbohydrate is essential to promote water-retention in the tissues and prevent loss of weight, but only such carbohydrates should be selected as will produce the least intestinal fermentation, such as dextri-maltose, which may be administered at first in small quantities, increasing the amount every second day."

Concerning the treatment of diarrhea, "If the weight remains stationary, it is an indication that loss of substance is occuring through the stools, mostly in the form of alkaline salts. To equalize this loss of substance, the diet must be increased, but in such a way as to avoid causing fermentation. This may be done by adding dextri-maltose and preparations of protein to the food, increasing the calories until the infant is taking 160 calories per kilo. of body weight."—*H. L. Ratnoff: Nutritional disturbances, Arch. Pediat. 41:771, Nov. 1924.*

1924

"The most desirable sugar is dextri-maltose, because of all the sugars maltose is least apt to ferment."—*A. I. Blau: The use of protein milk in pediatrics, Med. J. & Rec. 119:359, April 2, 1924.*

1924

"Maltose is absorbed in larger proportion than other sugars, breaks up into two molecules of dextrose, and often quickly gives a striking gain in weight."—*F. M. Fry: Fixed principles in the feeding of infants, Canad. M. A. J. 14:503-508, June 1924.*

1924

"The treatment of artificially fed children in the first of these groups consists in putting them on a low fat dietary, and giving them carbohydrate in the form of one of the less fermentable sugars—e. g., dextrimaltose."—*L. G. Parsons: Wasting disorders of early infancy, Lancet, 1:687-694, April 5, 1924.*

1925

"According to Finkelstein, infants will tolerate a much higher mixture of maltose and dextrin than either lactose or cane sugar."

"Milk sugar causes abnormal acid fermentation. This results in symptoms of intestinal irritation due to destruction of epithelium which interferes with the proper emulsification of fats; therefore, the presence of fats acts as an additional irritant and provokes loose bowels.

"When intestinal irritation exists, caused by the presence of milk sugar, the symptoms will continue even though the milk sugar has been greatly reduced, because even small quantities of this milk sugar will keep up lactic acid fermentation and consequent destruction of the epithelium."

"Cane sugar is less irritating to the intestinal mucosa than milk sugar. It is easily assimilated, and for this reason has many advocates. I have seen good results therefrom. When malt sugar cannot be procured, my advice is to use cane sugar."—*L. Fischer: Diseases of Infancy and Childhood, F. A. Davis Co., Phila., 1925, vol. 1, pp. 65, 66, 67.*

1925

"If, however, dyspepsia develops, the skimmed milk or calcium caseinate solution should promptly be given before each breast-feeding. Dextri-maltose should be added because of the great need of these small infants for a high caloric diet. This sugar does not readily ferment and is well tolerated."—*A. M. Dannenberg: Dyspepsia in the breast-fed, new-born infant: causes, symptoms and management, Arch. Pediat. 42:281-291, May 1925.*

1925

In the treatment of diarrhea, "Dextri-maltose preparations are preferred, for they do not ferment readily, are rapidly absorbed and leave very little for fermentation."—*V. A. Blenkle: Protein milks in infant feeding, Arch. Pediat. 42:743-760, Nov. 1925.*

1925

"Infants gain in weight when malt-sugar or the malt preparations are given."—*L. Fischer: The Health-Care of the Baby, Funk & Wagnalls Co., New York, 1925, p. 96.*

1925

"While it would seem on theoretical grounds that milk sugar should be chosen, we find in practice that dextri-maltose seems to be the kind of sugar that works best."—*F. H. Richardson: Simplifying Motherhood, G. P. Putnam's Sons, New York, 1925, p 140.*

1926

"There is no proof that milk sugar is necessary for the infant's nutrition, although it is this sugar that occurs in the milk of all mammals and there is abundant clinical experience to show that the other carbohydrates are just as beneficial and more easily digested."

"Malt sugar (maltose and dextrin), however, seems to be more easily digested and better taken care of by infants having had much digestive trouble."—*R. H. Dennett: Simplified Infant Feeding, J. B. Lippincott Co., Phila., 1926, pp. 42, 61.*

1926

In intestinal intoxication, "I have had more experience with dried skimmed milk in which 2 to 5 per cent dextrimaltose, barley or rice flour has been cooked, and the mixture subsequently fermented by lactic acid bacilli or soured with lactic acid, than with any other food except protein milk."—*G. F. Powers: A comprehensive plan of treatment for the so-called intestinal intoxication of infants, Am. J. Dis. Child. 32-232-257, Aug. 1926.*

1926

"Preferably a dextrimaltose carbohydrate should be added after the bowel movements become thick and pasty."—*T. H. Harrell and E. Boyd: Dyspepsia in the breast-fed infant, Indiana M. J. 19:402-404, Oct. 1926.*

1926

In gastrointestinal disorders, "Dextri-maltose has been preferred to the other sugars as apparently less irritating."—*E. Cassie and U. Cox: The examination of the gastric contents in infants, with some considerations as to the value of lactic acid milk in infant feeding, Lancet, 2:322-325, Aug. 14, 1926.*

Continued down to 1934

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